THE

Calcutta Journal

NATURAL HISTORY.

Contributions towards a Flora of Ceylon. By GEORGE GARDNER, *Surgeon, F. L. S., Member of the Glasgow Philosophical Society, Corresponding Member of the Royal Botanical Society of Ratisbon, of the Horticultural Society of London, of the Natural History Society of Mauritius, and Superintendent of the Royal Botanical Gardens, Ceylon.*

ORD. NAT. TERNSTROMIACEÆ.

Previous to my arrival in Ceylon only three species of this natural order had been made known to Botanists as natives of the Island, viz. *Eurya Ceylanica*, R.W., *Cleyera lasiopetala*, R.W., which I now refer to *Eurya*, and *Gordonia Ceylanica*, R.W. Since then I have added seven additional ones, all of them new, with the exception of one, *Cleyera gymnanthera*, W. & A., which is likewise a native of the Neilgherry mountains, and the only one of the Ceylon species which ranges beyond the limits of the Island. One of my new species, forming a new genus, was recently published in this Journal under the name of *Carria speciosa*, Gardn. Moon, in his Catalogue of Ceylon plants, enumerates, under the name of *Cistus lobatus*, *Cochlospermum Gossypinum* DC.,

but it is not truly a native, being only found in the vicinity of temples, and now, moreover, it is removed by Lindley from *Ternstromiaceæ*, and more correctly referred to *Ciatheæ*. Mr. Bennett, in his recent work "on Ceylon and its capabilities," gives a coloured drawing of a species of the genus *Thea*, which he says was found growing wild at Batticaloa, on the east side of the Island. The figure is certainly that of a species of Tea, and resembles much more the Assam than the Chinese plant. During a recent visit which I made to Batticaloa, I did not meet with it in my botanical rambles, nor did any of the English residents there know any thing about it. As I cannot believe Mr. Bennett to be guilty of imposition, I hope that it will some day reward my researches. It is very likely a native of the mountains inland from Batticaloa, which I have not yet visited. If found, it will form a valuable addition to the Flora of Ceylon.

EURYA, *Thunb.*

The genus *Eurya* was established in the year 1789, by Thunberg, in his *Flora japonica*, for the reception of a single species; but since then, and that principally within the last few years, many others have been added to it from the Eastern Islands and various parts of the continent of India. It has not, however, so far as I am aware, even been suspected by botanists that this genus is identical with *Freziera*, a genus established by Swartz, at a later period, in his *Flora India occidentalis*, for the reception of two West Indian plants I was first led to suspect that these genera were not distinct from the great resemblance they have in habit; and after a more particular examination of several West Indian and South American species of *Freziera* which I possess, as well as the detailed descriptions and beautiful figures of five species in the "Plantes Equinoxiales" of Humboldt and Bonpland, I do not find a single character by which to distinguish them from the Euryas of the Eastern world. The diœcious cha-

racter ascribed to *Eurya* is not constant, and even if it were, would not constitute a generic distinction. I posses, in my private herbarium, all the hitherto described Indian species but one, besides several undescribed ones; and one of them I find to be truly hermaphrodite, while on the other hand, Macfadyen, in his *Flora jamaicensis*, has lately described a dioecious species of *Freziera*, and I find the same character to belong to a new species from Bolivia. According to Endlicher, the embryo of *Eurya* is exalbuminous, and that of *Freziera* albuminous. I find it in both to be enclosed in a thin coating of fleshy albumen. I therefore propose that the two genera should be united, and for which *Eurya*, as being the oldest name, must be retained. *Freziera* may still be adopted as the name of the section under which the hermaphrodite species will rank.

The Eastern species of *Eurya* resemble each other so much in general appearance, that it is a difficult matter to find characters by which to distinguish them. The leaves do not afford good distinctions: more dependance is to be placed on the parts of the flower, but particularly the style and stigmata. The existence or non-existence of hairs on the young shoots, taken along with other characters, is also valuable.

EURYA, *Thunb.*

FREZIERA, *Swartz Fl. Ind. occident.* 2. *p.* 971.—EROTIUM, *Solander ex Swartz Prodr. p.* 85.

SECTION I.—EUEURYA. Flores dioici.

1. EURYA ELLIPTICA, *Gardn.*

E. ramulis teretibus glabris, foliis ellipticis obtusè acuminatis retusis basi obtusis margine subrevolutis mucronato-serrulatis coriaceis glaberrimis, floribus axillaribus geminatis breviter pedicellatis glabris sepalis latè ovato-suborbiculatis obtusis, petalis ellipticis, staminibus 5-6, antheris ovato-

cordatis breviter apiculatis, stylis brevissimis, stigmatibus 3 reflexis.

Hab.—Adam's Peak, at an elevation of about 7,000 feet. Flowers in March.

Descr.—A *shrub* 6-8 feet high, entirely glabrous. *Leaves* shortly petiolate, 2-2½ inches long, 15-18 lines broad.

Obs.—Very distinct from any described species, but seems to approach *E. reticulata*, Krthls., a native of Sumatra.

2. Eurya membranacea, *Gardn.*

E. ramulis teretibus pilosiusculis, foliis oblongo-lanceolatis acuminatis, acumine obtusis retusis, basi acutis membranaceis obtusè mucronato-serratis, costa media subtus pilosiuscula, floribus axillaribus 3-5 breviter pedicellatis glabris, sepalis orbiculatis emarginatis mucronatis, petalis ellipticis, staminibus 12-14, antheris sagittatis acutis, stylis brevis, stigmatibus 3 reflexis.

Hab.—Elephant plains, and on the descent from the Horton plains to Galagama. Flowers from October to February.

Descr.—A large straggling *shrub*, with slender branches. *Branchlets* round, slightly pilose. *Leaves* shortly petiolate, 2½-4 inches long, 10-18 lines broad.

Obs.—This species resembles *E. angustifolia*, Wall., but the structure of the flower is very different. It is perhaps too closely related to the following species.

3. Eurya ceylanica, *R. W.*

E. ramulis teretibus pilosis, foliis oblongis acuminatis, acumine obtusis retusis, basi acutis coriaceis margine revolutis obtusè mucronato-serratis, costa media pilosa, floribus axil-

laribus 2-4 breviter pedicellatis glabris, sepalis rotundatis emarginatis, petalis obovatis, staminibus 14, antheris oblongis obtusis, stigmatibus 3 subsessilibus reflexis, baccâ globosâ pilosiusculâ.

Eurya *Ceylanica*, *R. Wight*, *Illust. of Ind. Bot.* 1, *p.* 98.

Hab.—Pussilawa, Newera Ellia, and Adam's Peak, at an elevation of from 3,000 to 7,000 feet. Flowers all the year.

Descr.—A *shrub* 12-16 feet high. *Branchlets* round, pilose. *Leaves* shortly petiolate, 2-3½ inches long, 12-18 lines broad.

4. Eurya parvifolia, *Gardn.*

E. ramulis subflexuoso-ancipitis pilosis, foliis parvis obovato-ellipticis obtuse acuminatis retusis margine valdè revolutis acutè mucronato-serratis, floribus axillaribus 2-3 subsessilibus, sepalis orbicularibus emarginatis glabris, petalis obovatis, staminibus 9, antheris ovato-cordatis obtusis.

Hab.—Common on the margins of streams between Newera Ellia and the Horton plains. Flowers in February.

Descr.—A *shrub* 3-12 feet high. *Branches* round, covered with black patent hairs. *Leaves* shortly petiolate, 9-15 lines long, 6-8 lines broad, glabrous, or with the mid-rib occasionally slightly pilose.

Obs.—A very distinct species, easily recognised by its somewhat two-edged branchlets and small leaves.

To this Section also belongs all the Indian species with which I am acquainted, viz. *E. acuminata*, DC., *E. angustifolia*, Wall., *E. Roxburghii*, Wall., *E. tristyla*, W. and A., *E. Wightiana*, Wall., besides what I believe to be two new species from the Neilgherries, two which I possess from

Griffith from Malacca, *Freziera dioica*, Macf., and Pentland's n. 193 from Bolivia.

SECTION II.—FREZIERA. Flores hermaphroditi.

5. EURYA LASIOPETALA, *Gardn.*

E. arborea, foliis oblongo-lanceolatis obtusis vel subacuminatis retusis margine revolutis minutè denticulatis glabris, floribus axillaribus solitariis, pedicellis elongatis cernuis apice incrassatis, petalis extus sericeo-tomentosis, staminibus numerosis, antheris linearibus mucronatis pilosis, stylis elongatis filiformibus, stigmatibus 3 cylindricis obtusis, baccâ globosâ.

Cleyera *lasiopetala*, *R. W.*, *Illust. Ind. Bot.* 1. *p.* 99.

HAB.—Rambodde pass, Newera Ellia, and the Horton plains, at an elevation of from 5,000 to 6,000 feet. Flowers in May.

DESCR.—A *tree* 20-30 feet high. *Branches* round. *Leaves* alternate, petiolate, penninervous, with coarse reticulations, about 4 inches long, and from 9-12 lines broad, the margins very much revolute at the base. *Pedicels* 10 lines long. *Calyx* bibractiolate at the base. *Sepals* 5, free, imbricate, roundish, nearly equal, reticulated, margins membranous, externally sericeo-pilose, $4\frac{1}{2}$ lines long. *Petals* 5, hypogynous, alternating with the calycine segments, between elliptical and orbicular, slightly cohering at the base, sericeo-tomentose externally, except the margins which are glabrous, 6 lines long, with an imbricated æstivation. *Stamens* numerous, adhering in a single series to the base of the petals: *filaments* complanate, 2 lines long. *Anthers* introrse, linear, 2-celled, mucronate, covered with scattered erect hairs, attached by the base, and dehiscing longitudinally. *Ovary* free, 3-celled. *Ovules* numerous, campylotropous, attached to two placentas which project from the inner angles of the cells. *Style* filiform: *stigmas* 3, cylindrical, obtuse. *Berry* dry, globose, 5 lines in diameter, crowned by the persistent style, 3-celled, but apparently 6-celled, from the protruded plantæ reaching nearly to the outer

parietes of the cells. *Seeds* numerous, pendulous, somewhat ovate, flattened: *testa* crustaceous, black, pitted, shining. *Embryo* cylindrical, homotropous, curved in the axis of scanty fleshy albumen: *Cotyledons* and *radical* superior.

Obs.—This tree was some years ago described by Dr. Wight as a *Cleyera*, but its single series of stamens and numerous ovules and seeds distinguish it from that genus. It agrees perfectly with *Eurya*, and is the largest flowered species I am acquainted with.

To this section also belongs the seven species of *Freziera* described in DeCandolle's Prodromus, and *F. integrifolia*. Benth. in Plant. Hart. 18.

CLEYERA, *Thunb.*

1. Cleyera emarginata, *Gardn.*

C. tota glabra, ramulis dichotomis, foliis obovatis vel elliptico-oblongis obtusis emarginatis basi cuneatis coriaceis margine valdè revolutis integriusculis vel versus apicem subcrenulato-serratis, floribus axillaribus solitariis ebracteolatis, sepalis petalisque glabris, antheris glabris apice emarginatis, stylis 2 distinctis.

α. *Latifolia*, foliis late obovatis indistincte crenulatis.

β. *Angustifolia*, foliis elliptico-oblongis crenulato-serratis.

Hab.—Var. α. Margins of streams between Adam's Peak and Newera Ellia: Var. β. Banks of streams Horton plains. Flowers in February and March.

Descr.—*A shrub* 10-16 feet high. *Branches* dichotomous, round. *Leaves* crowded at the ends of the branchlets, alternate, petiolate, obovate, or elliptical-oblong, obtuse emarginate, cuneate at the base, margins revolute, obtusely crenato-serrated from the middle up-

wards, coriaceous, glabrous, veinless, $1\frac{1}{2}$-$2\frac{1}{2}$ inches long, 9-15 lines broad, dark green and shining above, pale green beneath: *Petiole* flattened, 2-4 lines long, of a purplish colour. *Pedicels* axillary, solitary, terete, glabrous, 9 lines long, of a purplish colour. *Calyx* bractless, free: *Sepals* 5, roundish, concave, glabrous, imbricated, of a yellowish colour tinged with purple, unequal, the largest ones about 2 lines long. *Petals* 5, hypogynous, roundish, concave, imbricated, of a pale yellow colour, the outer ones tinged with purple, about 4 lines long. *Stamens* numerous, hypogynous, in several series: *filaments* flat, scarcely a line long. *Anthers* continuous, linear-oblong, introrse, 2-celled, cells bursting longitudinally, separated by a broad connective, which is terminated by a broad emarginate appendix. *Ovary* superior, conical, glabrous, 2-celled, with 2-collateral ovules suspended from the top of the dissepiment. *Styles* 2, short. *Stigmas* broadly subreniform, with undulated margins. *Fruit* unknown.

Obs.—This plant differs from the genuine species of the genus in the want of bracts to the calyx, and having two distinct styles, each of which bears a large subreniform stigma with undulated margins, but otherwise the structure is the same. The two varieties above described appear to be very distinct species, and at first I considered them as such, but on more attentive examination, could not find characters by which to distinguish them.

GORDONIA, *Ellis.*

1. Gordonia elliptica, *Gardn.*

G. Arborea glaberrima, foliis sessilibus exactè ellipticis utrinque obtusissimis margine subrevolutis integerrimis apice emarginatis coriaceis supra venoso-reticulatis subtus eveniis, floribus axillaribus sessilibus, sepalis orbicularibus emarginatis extus puberulis margine ciliatis, petalis 5 obcordatis extus puberulis basi coalitis, antheris oblongis, ovario sericeo-piloso,

stigmatibus 5 radiatis, capsulis oblongis pentagonis pilosiusculis.

Hab.—Forests near the Elephant plains. Flowers in October.

Descr.—A large *tree*. *Branchlets* round, glabrous, with the leaves crowded at their extremities. *Leaves* nearly quite sessile, 3-3½ inches long, 2 inches broad. *Flowers* white, 2 inches in diameter. *Capsule* woody, 15 lines long, 5-celled, with a loculicidal dehiscence. *Seeds* unknown.

Obs.—Near *G. Ceylanica*, R. W., from which it is principally distinguished by its glabrous, not pilose, branchlets, its very differently shaped leaves, which are broadest, not narrowest, at the base, and more sessile and larger flowers. In some of my specimens of *G. Ceylanica* there is a slight appearance of serratures on some of the leaves, thus approaching it to the Neilgherry *Gordonia obtusa*, which however, is a very distinct species.

ORD. NAT. FLACOURTIACEÆ.

ROUMIA, *Poit.*

1. Roumea hebecarpa, *Gardn.*

R. arborea inermis, foliis petiolatis ovato-oblongis vel oblongo-lanceolatis acuminatis basi obtusis integris vel dentato-serratis penniveniis supra nitidis pubescentibus subtus pallidis tomentosis, pedicellis axillaribus paucis, baccis globosis pubescentibus.

Hab.—Rare in the jungles of the Central Province, as at Cundasalle. Flowers in June.

Descr.—A dioecious *tree*, 16-20 feet high. *Branches* round, ash coloured, warted, the younger ones pubescent. *Leaves* alternate, petiolate, ovate-oblong, varying to oblong-lanceolate, acuminate, obtuse at the base, entire or dentate-serrate, pennivenous, veins about six on each side, green, shining, and minutely pubescent above, pale and tomentose beneath, about 4 inches long, by about 20 lines broad. *Male flowers: Peduncles* axillary, very short, often geminate. *Pedicels* rather numerous, umbellate, about 4 lines long, pubescent. *Calyx* deeply 5-7 parted, lobes lanceolate, acute, pubescent. *Petals* none. *Stamens* numerous: *filaments* filiform, as long as the calycine segments: *anthers* introrse, obtuse, 2-celled, dehiscing longitudinally. *Hypogynous disk* none. *Female flowers: Pedicels* axillary, solitary, or two or three together. *Calyx* 5-7 parted, lobes ovate-lanceolate, acute, pubescent, persistent, about $3\frac{1}{2}$ lines long. *Ovary* sessile, free, surrounded at the base by a crenulated annular *disk*, densely pilose-pubescent, subglobose, 1-celled, with from 5-7 parietal placentæ reaching nearly to the axis, which they ultimately do in a more advanced stage. *Ovules* one on each side of each placenta, anatropous. *Styles* 6-7, about $1\frac{1}{2}$ lines long, divergent, pilose-pubescent: *stigma* radiately fimbriated. *Fruit* a globose, brownish-purple, many seeded berry, about an inch in diameter, pubescent, crowned by the persistent styles. *Seeds* in an external and internal series, those in the external one, somewhat triangular and pendulous, those in the internal, ovate compressed, with their narrow ends towards the axis, and suspended from a curved cord which proceeds from the base of the fruit, surrounded on their margins by a pellucid wing consisting of agglutined fibrillæ: *testa* membranous, villous. *Embryo* in the axis of thin fleshy albumen, orthotropous: *Cotyledons* foliaceous, orbicular, cordate: *radical* terete, obtuse, directed towards the hilum.

Obs.—The only hitherto described species of *Roumea* is a native of St. Domingo, in the West Indies, for the *R. inermis* of DeCandolle from Bengal seems to belong to a very different family. The present species is called *Katambilla* by the Cingalese, and the fruit, which is very acid, is used by them in their curries.

ERYTHROSPERMUM, *Lam.*

1. Erythrospermum phytolaccoides, *Gardn.*

E. arborea, foliis sparsis petiolatis oblongo-lanceolatis acuminatis basi acutis utrinque glaberrimis integris vel obscurè subserratis, racemis paniculatis axillaribus terminalibusque folio subæquantibus, sepalis ovatis obtusis concavis, petalis ovato-oblongis ciliatis, staminibus 5, antheris sagittatis.

Hab.—Woods between Balangoda and Palmadulla, in the Saffragam district, February 1846.

Descr.—A *tree* 20-30 feet high. *Branches* round, glabrous, the younger ones greenish, warted. *Leaves* alternate, petiolate, from ovate-oblong to oblong-lanceolate, acuminate, acute at the base, entire or obscurely subserrated, glabrous, pennivenous, veins somewhat prominent beneath, intervenium widely reticulated, dark green and shining above, yellowish green beneath, 4½-6 inches long, 18-27 lines broad: *petiole* 6-8 lines long, convex on the under surface, channelled above, thickened both at the base and apex. *Stipules* small, lanceolate, acute, deciduous, of a reddish colour. *Racemes* paniculate, axillary, bluntly angled, glabrous, many flowered, of a whitish colour, and about as long as the leaves. *Pedicels* about 2 lines long, with three minute, acute, glandularly serrated bracteoles at the base. *Calyx* free; *sepals* 5, ovate, obtuse, concave, of a yellowish white colour, tinged occasionally with red, about 2 lines long. *Petals* 5, hypogynous, ovate-oblong, obtuse, ciliated, of the same length as the sepals, white. *Stamens* 5, alternate with the petals: *filaments* very short flattened: *anthers* sagittate, about 1½ lines long, 2-celled, cells marginal, opening longitudinally, widely separated by a broad thin fleshy connective. *Ovary* free, ovate, glabrous, 1-celled, with numerous ovules attached to 3-parietal placentæ. *Style* short, of a reddish colour: *stigma* 3-lobed, lobes linear, obtuse. *Fruit* unknown.

Obs.—This is the only species of *Erythrospermum* which has yet been found in Ceylon, and, indeed, with the exception of a variety of *E. ellipticum*, which DeCandolle describes from Java, is the only one which has been found to the eastward of the Mauritius and Bourbon, those Islands being the focus of the genus.

ORD. NAT. HOMALINEÆ.

BLACKWELLIA, *Commers.*

1. Blackwellia Ceylanica, *Gardn.*

B. foliis petiolatis oblongo-ellipticis acuminatis basi acutis crenato-dentatis glabris nitidis, spicis axillaribus longissimis nutantibus, floribus subpentameris.

Hab.—In forests of the Central Province, at an elevation of about 3,000 feet. Flowers in April.

Descr.—A *tree* 20 feet high. *Leaves* alternate, the acuminated apex entire obtuse, pennivenous, with the veins prominent on both sides, and the intervenium finely reticulated, 4-4½ inches long, 1½-2 inches broad. *Spikes* 6-9 inches long, densely floriferous. *Flowers* about 3 lines in diameter, of a pale greenish colour, arranged in fascicles, shortly pedicellate. *Calyx* adherent, the *limb* with from 8-12 divisions in two series: those of the *external* series oblong, obtuse, pubescent and ciliated, with an elevated horizontal brown gland at their base inside: those of the *internal* series obovato-oblong, obtuse, pubescent, ciliated, and longer than the external ones. *Petals* none. *Stamens* equal in number with the inner segments of the calyx, opposite to them, and adhering to their base: *filaments* filiform, glabrous, erect; *anthers* subglobose. *Ovary* 1-celled, with numerous ovules attached to parietal placentæ, which latter are equal in number with the styles. *Styles* 4-6, filiform, spreading. *Fruit* unknown.

Obs.—This, the only species indigenous to Ceylon, comes near to *B. spiralis*, Wall., but in it the leaves are subsessile, much larger, and pubescent on the under surface.

ORD. NAT. PROTEACEÆ.

HELICIA, *Lour.*

1. Helicia Ceylanica, *Gardn.*

R. foliis alternis petiolatis elliptico-obovatis obtusissimis integris apice emarginatis basi cuneatis glabris, racemis axillaribus, folio subæquantibus, pedicellis geminatis perianthiis ovariisque glabris.

Hab.—Banks of the Massnawatté in the Ambegamoa district. Flowers in February.

Descr.—A *tree* about 20 feet high, glabrous in all its parts. *Leaves* 4-6 inches long, 1½-2 inches broad. *Raceme* 3-4 inches long, together with the pedicels of a very dark purple colour. *Pedicels* geminate, 3 lines long. *Perianth* clavate in the unexpanded state, of a pale yellow colour, and about 9 lines long: *divisions* 4, recurved, each bearing a stamen on its inner surface a little below the apex. *Anthers* sessile linear, 2-celled. *Style* filiform: *Stigma* clavate. *Hypogynous glands* 4, distinct, obtuse. *Ovary* 1-celled, with 4 erect, superimposed ovules attached to a parietal placenta.

Obs. I.—This species seems to approach *Helicia Moluccana*, Blume (*Rhopala Moluccana*, R. Br.), but judging from the description, that species has much longer petioles, and the leaves are not emarginate at the apex. The ovary in that species, moreover, has only two ovules, while in mine there are four.

Obs. II.—The genus *Helicia* represents in the Eastern world the *Rhopalas* of Equinoctial America, and is distin-

guished from them by its erect ovules, indehiscent fruit, and wingless seeds. Of the eight species which I find recorded in Botanical works, one is a native of Cochin China, five of the Eastern Islands and the Straits of Malacca, and two of Silhet. The present species, the only one hitherto discovered in Ceylon, has the most Westerly range of any of the genus, none as yet having been found in the peninsula of India.

ORD. NAT. THYMELACEÆ.

DAPHNE, *Linn.*

1. Daphne inamœna, *Gardn.*

D. foliis breviter petiolatis oblongis acutis basi subcuneatis utrinque adpressè piloso-pubescentibus subtus pallidis reticulatis, racemis axillaribus multifloris folio brevioribus, floribus pubescentibus.

Hab.—Margins of woods at Newera Ellia, at an elevation of about 6,000 feet. Flowers nearly all the year.

Descr.—A *shrub* 6-8 feet high with erect slender branches. *Branches* round, the younger one pilose-pubescent. *Leaves* alternate, shortly petiolate, oblong, acute, narrowed towards the base, entire, adpressly pilose-pubescent on both sides, the under surface pale, reticulated, 1½-2 inches long, 6-9 lines broad: *petiole* 1 line long, pilose. *Racemes* axillary, shorter than the leaves, about 12 flowered. *Flowers* shortly pedicellate. *Perianth* a cylindrical *tube* about 3 lines long, pubescent, and of a yellowish green colour, with a 4-parted *limb*, the lobes of which are small, ovate, obtuse, and spreading. *Stamens* 8, in two rows at the upper part of the tube: *filaments* very short: *anthers* oblong, yellow. *Ovary* free, pilose, shortly pedicellate, 1-celled, with a single pendulous ovule. *Style* very short. *Stigma* globose. *Drupe* dry, oblong, enclosed in the

persistent tube of the perianth, about $1\frac{1}{2}$ line long, containing a single seed: *putamen* black, crustaceous. *Seed* inverse: *albumen* none: *Embryo* orthotropous: *Cotyledons* plano-convex: *radical* short, superior.

Hab.—A very distinct species from any of those hitherto described.

GNIDIA, *Linn.*

Some very interesting links connecting the Flora of Western India with that of Southern Africa have lately been made known by Dr. Wight. Thus in the last part of his "Icones Plantarum," (Vol. iii, part 4,) he has published drawings and descriptions of a species of *Vogelia* and of *Apodytes*,* both African genera hitherto unknown in India. This connection will be further illustrated by the present article. All the hitherto published species of *Gnidia* are natives of South Africa, but I have now to make known three Indian species, one of which is peculiar to Ceylon, another to the Neilgherry mountains, and a third common to both countries. One of them has long been known to Botanists by the name of *Daphne eriocephala*, that being the appellation given to it by Dr. Wallich in his "Catalogue," but, so far as I am aware, no description of it, or of any of the others, has yet been published. According to Wallich the same plant was referred by Heyne to *Lachnæa*, but it, as well as the other two, differ from both these genera in having faucial scales. With *Gnidia*, to which I now refer them, they agree in every thing except the number of the parts of the flower, the African species being tetramerous, while the Indian ones are pentamerous. This, however, is not of sufficient importance to exclude them from the genus, of which they will form a section, and to which I propose to give the name of *Dingia*,

* I have lately met with the same or an allied species in Ceylon.

an anagram of *Gnidia*. The two sections may be characterized thus:—

Sect. I. Eugnidia.—Flores tetrameri.

Sect. II. Dingia.—Flores pentameri.

Two only of the species, as already observed, are natives of Ceylon, but I add also a description of the Neilgherry plant, so that all the known Indian species may stand together.

1. Gnidia (Dingia) insularis, *Gardn.*

G. frutiçosa, ramis dichotomis sericeo-villoso-tomentosis, ramulis ad apicem foliosis, foliis alternis breviter petiolatis lineari-lanceolatis obtusis mucronatis supra villosis vel glabriusculis subtus sericeo-villosis, capitulis terminalibus multifloris involucratis, involucri squamis oblongis acutis utrinque sericeis, floribus pentameris extus sericeo-villosis.

Hab.—In open jungle on the Hautane range, at an elevation of from 2-3000 feet. Flowers in February and March.

Descr.—A *shrub* 8-12 feet high. *Leaves* 2½ inches long, 5-8 lines broad, a little narrowed towards the base, membranous entire. *Involucral scales* about 6 lines long. *Tube* of the *perianth* tubular, 6 lines long, the lower half covered with long white silky hairs, the upper half with much shorter ones: *limb* 5-parted, *lobes* oblong, obtuse, glabrous internally, externally covered with long white silky hairs. *Faucial scales* 5, inserted between the bases of the segments of the perianth, oblong, slightly oblique at the apex. *Stamens* 10, in two series, the lower ones included, the upper exserted: *anthers* linear. *Style* lateral, filiform, included: *stigma* capitate, rough: *ovary* free, pedicellate, pilose, 1-celled, with a single pendulous ovule.

2. Gnidia (Dingia) eriocephala, *Gardn.*

G. fruticosa, ramis dichotomis glabriusculis, ramulis foliosis, foliis alternis breviter petiolatis lanceolatis acutis mucronatis

versus basim subcuneatis utrinque glabris, capitulis terminalibus multifloris involucratis, involucri squamis ovato-lanceolatis acutis utrinque sericeis, floribus pentameris extus sericeo-villosis.

Lachnæa *eriocephala, Heyne ex Wall.*

Daphne *eriocephala, Wall. Cat. n.* 1051. (Sine descriptione.)

Hab.—In open jungle, at Galagama, in the district of Saffragam, Ceylon. Common also on the Neilgherry mountains, peninsula of India. Flowers in February and March.

Descr.—A *shrub* 8-12 feet high. *Leaves* 3½-4½ inches long, 8-12 lines broad, green above, pale beneath, pennivenous, with the intervenium finely reticulated, membranous entire. *Involucral scales* 6-7 lines long, 3 broad, acute, with the margins above undulated. *Tube* of the *perianth* tubular, 6-7 lines long, the lower half covered with long white silky hairs, the upper half with much shorter ones: *limb* 5-parted: *lobes* elliptical, very obtuse, glabrous internally, sericeous externally. *Faucial scales* 5, inserted between the bases of the segments of the perianth, obovate, truncate, and occasionally 2-3-dentate. *Stamens* 10, in two series, the lower ones included, the upper exserted: *anthers* linear. *Style* lateral, filiform, included: *stigma* capitate, somewhat hispid. *Ovary* free, pedicellate, pilose at the apex, 1-celled, with a single pendulous ovule.

Obs.—This species is readily distinguished from the preceding one by its glabrous, not silky, branchlets, very much larger and glabrous leaves, and differently shaped faucial scales. The hairs also on the external surface of the lobes of the perianth are much longer.

3. Gnidia (Dingia) sispaïensis, *Gardn.*

G. sub-arborea, ramis dichotomis, ramulis glabris ad apicem foliosis, foliis alternis subsessilibus oblongis obtusis vix retusis utrinque glabris, capitulis terminalibus multifloris in-

volucratis, involucri squamis ovato-oblongis obtusis utrinque sericeis, floribus pentameris extus sericeo-villosis.

HAB.—Margins of woods near the top of the Sispara pass, Neilgherry mountains: *Wight and Gardner.* Flowers in February.

DESCR.—A small *tree*. *Leaves* 2-2½ inches long, 9-12 lines broad, green above, pale beneath, entire, slightly retuse at the apex, pennivenous, with a rather coarsely reticulated intervenium. *Involucral scales* 6 lines long, 3½ broad, very obtuse. *Tube* of the *perianth* tubular, rather infundibuliform upwards, 6 lines long, the lower half covered with long brownish coloured hairs, the upper half with much shorter ones: *limb* 5-parted: *lobes* elliptical, obtuse, internally glabrous, externally covered with long brownish hairs. *Faucial scales* 5, inserted between the bases of the segments of the perianth, obovate, somewhat 2-lobed. *Stamens* 10, in two series, the lower ones included, the upper exserted: *anthers* linear-oblong. *Style* lateral, filiform, included: *stigma* capitate, hispid. *Ovary* free, pedicellate, covered, particularly at the apex, with long brown hairs, 1-celled, with a single pendulous ovule.

OBS.—This is a very distinct species from the other two, its broad short leaves, and brown perianthal hairs distinguishing it at first sight.

ORD. NAT. TACCACEÆ.

TRICHOPUS, *Gaert.*

CHAR. GEN.—*Flores* hermaphroditi. Perianthium corollini tubus cum ovario connatus, limbus superus, 6-partitus, sub-æqualis, patens, persistens. *Stamina* 6, basi laciniarum limbi inserta: *filamenta* brevissima, medio incrassata: *antheræ* introrsæ, subreniformes, biloculares, loculis parallelis valdè discretis, connectivo pellucido apice longe apiculato, extus ad basim bidentato. *Ovarium* cum perianthii tubo connatum,

alato-triangulare. *Ovula* 2, in loculorum angulo centrali superposita, pendula. *Styli* 3, breves, carnosi, complanati, erecti: *stigma* bilobata, lobis obovatis, complanatis, obtusis reflexis. *Capsula* obovata, alato-triangulata, 3-locularis, loculis disperma. *Semina* super-imposita, ex angulo centrali loculorum pendula, subovata, compresso-subtriquetra, rugosa, hinc gibba, inde sulco longitudinali exsculpta: *testa* tenua, membrancea, arctissima nucleo adnata. *Embryo* orthotropus, in sulco basi albuminis cornei minimus, extremitate radiculari albumen perforante et umbillicum attigenti, e vitello exserta, nec ab albumine inclusa.

Herba *Ceylanica*; foliis *longe petiolatis, linearibus, lanceolatis, vel ovato-cordatis, triplinerviis, reticulatis,* petiolis *medio floriferis,* pedicellis *uniforis,* floribus *purpureis.*

1. Trichopus *Ceylanicus, Gaert.* 1. 44. *t.* 14.—*Trichopodium cordatum, intermedium, et angustifolium, Lindl. in Bot. Reg. Sub. Fol.* 1543.

Hab.—On shady banks in the Western and Southern Provinces. Abundant at the foot of Adam's Peak. Flowers in March.

Descr.—*Herbaceous,* 9-15 inches high. *Caudex* short, repent, radicant, scaly: *scales* scarious, ovato-lanceolate, acuminate, brownish, about 5 lines long. *Roots* fibrous, yellowish. *Leaves* sub-cæspitose, with very long petioles, from linear to ovato-cordate, obtuse, emarginate, and apiculate at the apex, acute, obtuse or subcordate at the base, entire, glabrous, 3-nerved, with the nerves prominent beneath, intervenium coarsely reticulated, from 3½-5 inches long, exclusive of the petiole, and from half an inch to 3 inches broad: *petiole* 6-9 inches long, geniculate above the middle, the *lower* portion terete, striated, glabrous, the *upper* subtriangular, striated, glabrous, channelled on its upper face. *Pedicels* arising from the base of the upper portion of the petiole on its internal face, 1-3, but with the remains of pre-existing ones, slender, terete, glabrous, 12-15 lines long, 1-flowered. *Perianth* adherent; *tube* obovate, triangular, the angles winged, green-

ish: *limb* spreading, 6-lobed, in two series, lobes of the external series ovate-lanceolate, acute, apiculate, those of the inner series ovate, acute, apiculate, both of the series nearly equal in length, about 2 lines long, and of a purple colour. *Stamens* 6, inserted on the base of the segments of the perianth: *filaments* very short, thickened in the middle, white: *anthers* introrse, subreniform, 2-celled, cells widely separated by a thin pellucid connective, which is bidentate externally at the base, and terminated by a long linear, obtuse apiculous. *Ovary* inferior, triangular, glabrous, 3-celled, each cell containing two super-imposed ovules, which are attached by their middle to the inner angle. *Styles* 3, very short, fleshy, conniving, flattened: *Stigma* 2-lobed, lobes obovate, flattened, obtuse, reflexed, white. *Capsule* obovate, triangular, the angles somewhat 3-winged, 3-celled, each cell containing 2 super-imposed seeds. *Seeds* attached by the middle to the inner angles of the cells by a brown filiform umbilical cord. They are of a compressed ovate, or subtriangular shape, with their broad ends truncated, and these are opposed to each other, the narrow ends pointing the one to the apex of the capsule, the other to its base. The *testa* which is very thin, and adheres firmly to the horny albumen, is of a yellowish brown colour, and pilosely pubescent. The *albumen* consists of a broad oblong plate, very horny, which is rolled up longitudinally, leaving an open sulcus along the whole length of the seed on one of its sides, and that margin which is next the placenta has a transverse slit in the middle of it, through which the umbilical cord passes, and at the bottom of which the embryo lies imbedded in the albumen, but not entirely, for the radical which points towards the hilum is protruded beyond it, but cannot be seen till the base of the umbilical cord is removed. The *embryo* is very small, the *radical* short, acute, and enclosed in the vitellus, and the single cotyledon is truncated.

Obs. I.—As no exact description of this very curious plant has hitherto been published, I conceive that the above details, made on the spot from recent specimens, will be valuable to Botanists. I have preferred retaining Gaertner's name rather than adopting the modification of it which Lindley has proposed in the Botanic Register. Three species are

established by Lindley, characterized principally by the shape of the leaves, but I believe them all to be variations of the same plant. They may all be seen growing together, and, indeed, the leaves vary very much on the same plant.

Obs. II.—Lindley refers *Trichopus* to the natural order *Aristolochiaceæ*, but from the above description it will be seen, that there is the most perfect resemblance between its reproductive organs and those of *Tacca*, with the exception of the economy of the capsule, which is a little different. We have, first of all, the adherent tube of the perianth and petaloid limb of *Tacca*, then the six distinct stamens inserted into the base of the segments of the perianth, the dilated filaments, and the *introrse anthers* with their parallel cells separated by a wide connective. In *Tacca*, however, the ovary is 1-celled, with numerous ovules attached to three parietal placentæ, while in *Trichopus* it is 3-celled, with only two ovules in each cell. But if we look at the structure of *Ataccia*, the close ally of *Tacca*, we there find that the placentæ are so much protruded from the walls that they almost reach the axis, and hence it is all but 3-celled. A little further protrusion would make it a truly 3-celled ovary, with the ovule attached to the inner angles of the cells. The fruit in *Tacca* and *Ataccia* is said to be baccate and indehiscent. In *Trichopus* it is capsular, but I have not ascertained in what manner it dehisces. The figure which Gaertner gives of the seed of *Trichopus* is very good, but that which he has taken for the embryo is the lower end of a membranous carunculus or aril which fills the latteral sulcus, and generally projects a little at the broad end of the seed. The embryo appears to be truly monocotyledonous.

So far then as the reproductive organs are concerned, I think there can be but little doubt that *Trichopus* has much greater affinity with *Taccaceæ* than with *Aristolochiaceæ*. As regards the habit of the plant it is somewhat peculiar, but not unlike that of some species of *Anthurium*, a

further evidence of the relation which exists between *Taccaceæ* and *Orontiaceæ*. The mode of inflorescence, though at first sight very different from that of *Tacca*, is in reality nearly quite the same, or at all events, is not greater than that which exists between *Anemia* and *Mohria*. In *Trichopus* the lower half of the petiole is evidently not simple, but formed by the union of it and a peduncle similar to the one in *Tacca*, which is shown by the united portion being round, while the upper, or true petiole, is channelled on its anterior face. The pedicels, then, arise from a sessile umbel, and the involucre of *Tacca* is represented by the scales which surround their bases.

Obs. III.—Jussieu placed *Tacca* at the end of his *narcissi*, remarking that it resembled *Aroideæ* in habit, but was otherwise distinct. Brown was the first (*Prod. p.* 340) to point out its intermediate character between *Aroideæ* and *Aristolochiaceæ*, and nearly all succeeding writers on the subject have adopted this view. The most material difference between *Aroideæ* and *Taccaceæ* is the adherent ovary of the latter, but this is only another example of the many which exist where orders that agree in every thing else differ in this respect, and by some systematists are widely separated in consequence. For example, we find this to be the case with *Ericaceæ* and *Vaccinaceæ*, with *Gesneriaceæ* and *Cyrtandraceæ*, and with *Cinconaceæ* and *Loganiaceæ*. Blume considers (*Enumer.* I. 82) that by the superior perianth of *Tacca* the affinity with *Aristolochiaceæ* is evident; while Lindley (*Veg. King.* 149.) says that to him the resemblance seems to be so slight as to be unworthy of notice. For my own part I conceive that the relationship is most completely established through *Trichopus*, which with the habit of *Anthurium* has the stamens of *Tacca*, and the capsule of *Asarum*.

Kandy, Ceylon: 24th Sept. 1846.

On two new Ceylon plants related to Sciaphila *of Blume*

By Capt. J. G. Champion, *95th Regt.*

[Communicated by G. Gardner, Esq., M.D.]

[The two little plants, descriptions of which my friend Capt Champion has communicated to me for publication in this Journal are certainly very distinct from anything of the kind hitherto described, and are, as he states, evidently related to the little known *Sciaphila* of Blume, a native of Java, the Flora of which Island bears very intimately on that of Ceylon. It is now nearly two years since I accompanied Capt. Champion to the locality where these plants grow, and was then struck with the resemblance which they bear in habit to some small plants, natives of Brazil, which a few years ago, I formed into a distinct family under the name of *Triuridaceæ* Capt. Champion alludes to this resemblance, but nothing is known of their seeds, and the economy of the male organs is totally different from that of the present plants. Capt. Champion believes that they ought to form the type of a distinct order, but I can find no marks by which they are to be distinguished from *Artocarpaceæ*, except, indeed, their habit, which certainly forms a great contrast to that of such trees as the jack and bread fruit, but that of itself is not sufficient to exclude them from the order, of which they will constitute a section. The numerous carpels of these little plants would seem to form a distinction between them and the *Artocarpus* tribe, but in the latter they are not always solitary, two being generally found in *Brosimum*.

Capt. Champion does not state where the point of attachment of the seed is within the utricule. In *Hyalisma ianthina* I find it to be at the upper part of the parietes as in *Artocarpus*, not, however, as in it on the side which bears the style, but on the opposite one. The embryo I find lying on the outside of a thin fleshy albumen, or but very slightly covered with it, on the side of the seed opposite to the raphe, nearly straight, and with the radical directed towards the hilum. The radical is short, conical, and of a brownish colour: the cotyledons elliptical, compressed, and white.—G. G.]

I enclose descriptions of two minute but interesting plants, with which I have been acquainted for some time, but which do not appear to have been known to the botanists who had

previously explored the Southern Province of Ceylon, possibly because they are so minute as not to be readily observed, and also from their being restricted, as far as my observation goes, to particular localities. I do not think, that any botanist can read the description of Sciaphila, as described by Blume, without feeling convinced of the very near affinity of it to my genus Aphylleia, and it is with Sciaphila, I feel but little doubt, that my plants range. Endlicher arranges Sciaphila after Artocarpeæ, amongst the "genera vix nota," adding "affinitas plane obscura," and the difficulty of its classification is increased by Blume's not having mentioned the structure of the seed, which, if resembling that of my genera Hyalisma and Aphylleia, would bring his plant nearer to the Moreæ than to the Artocarpeæ. From both Moreæ and Artocarpeæ, these plants may, however, be entirely separated, because they are not lactescent, and it seems to me, that it will be more natural to form of them a new group than to place them amongst either of two orders, which, with the exception of Dorstenia, are all shrubs or trees of large size, and very different habit. From Urticaceæ Proper they are readily separated by the stamina, which are so remarkable in the Nettle tribe for being inflexed when young, and when older for the irritable and elastic mode of their development; in habit they are nearer to Urticaceæ than to either Moreæ or Artocarpeæ.

Amongst the Moreæ I do not recognise any genus resembling the plants under consideration. Dorstenia is probably nearest, but very different. Amongst the Artocarpeæ, Brosimum is remarkable for having stamina which burst after the same method. The lateral style is peculiar, but common both amongst Moreæ and Artocarpeæ. That of Sciaphila is said to be sessile and punctiform, which is more after the fashion of Urticaceæ.

I shall therefore not feel surprised to find botanists ranging Sciaphila, Hyalisma, and Aphylleia, next indeed to the

Moreæ, but in a new group, distinguished from that order by its being elaqtescent, and by its having a more perfect development of inflorescence, viz. the regular calycine Perigonium found in Urticaceæ proper, whilst in the numerous utriculi of its fruit, aggregated on a common receptacle, it agrees with the Moreæ. Hyalisma and Aphylleia being very minute plants, there are one or two points which are not mentioned in the description, but which having come under my observation, it may be as well to mention. The seeds are very minute and difficult of dissection, and the embryo is so small, that it requires to be seen under a microscope, and it is then hard to say whether the cotyledons are one or two. The radicle is slightly curved and pointed towards the hilum. The albumen, which is originally liquid, becomes hard as the seed ripens, and usually causes the testa to burst on the side opposite to the raphæ. The bracteoles arise from near the root, and are there either alternate or occasionally nearly opposite. This construction seems to occur in both Hyalisma and Aphylleia. In male flowers of Hyalisma I have seen one anther burst, whilst the other three were unexpanded: this is interesting, as proving that they are not two stamina with the cells disjoined, as occurs in the American Triuraceæ, upon which Dr. Gardner has written an excellent paper, entitled 'Description of Peltophyllum,' and which in aspect has some resemblance to the plants I am describing. Hyalisma has a right to be called polygamous, as in poor specimens the flowers are all male, but whenever the plant is properly in season, it is usual to find it monœcious, with the female flowers below and the male above, and it is generally when the first scape has withered and the second is in flower, that male flowers alone are produced.

In Aphylleia the flowers are all hermaphrodite; when first blown, the stamina are conspicuous and the ovaries minute; the lateral style is at this period best seen. As soon as

the stamina are withered they are nearly obliterated by the growth of the ovaries, and the styles are so compressed by the same cause as to appear like a point between the ovaries, showing only the multifid stigma. The utriculi of Aphylleia remain much longer on their receptacle, without bursting, than those of Hyalisma; they dry without bursting, whereas if the fruit of Hyalisma is nearly ripe, the utriculi always open upon being dried. Having found specimens of Aphylleia in which all the flowers bore fruit, I feel pretty certain that I am right in considering it to be an hermaphrodite genus. The stamina of Aphylleia entirely disappear when the fruit is ripe. With respect to the structure of the stem of Hyalisma, it consists of cellular tissue without pith or concentric zones, and the skin is so slight that the stem is perfectly hyaline and the cells are distinctly visible with a small magnifying power: they are elongate and occasionally contain raphides. This cellular structure is to be expected in such a minute herbaceous plant. Having had abundance of opportunity of seeing these plants, in their different stages, I am certain that at no season of the year is a stem developed bearing leaves; the plants always consist of scapes which wither after fructification. Neither are they parasitic plants, but are found in rather moist soils in hilly places, under the shade of trees.

Hyalisma. Genus Novum.

(Plate IV.)

Flores monoici—*Perigonium* 8-partitum, lobis divergentibus—Fl. masc. *Stamina* 4, laciniis perigonii alternis adnata et opposita: *filamenta* brevia: *antheræ* peltatæ bilamellatæ, lamellis toto ambitu solutis apertæ. *Ovarii* rudimentum nullum—Fl. fæm. *Stamina* nulla. *Ovaria* plurima, receptaculo sub-convexo imposita. *Stylus* lateralis, obliquus, linearis: *stigmate* acuto. *Utriculi* plurimi, basi verticaliter

dehiscentes, membranacei, glandulis pellucidis tecti. *Semen* nudum, ovoideum basi apiculatum: *testa* dura, fragilis, reticulata: *raphæ* notata. *Embryo* inter albumen minimus: *radicula* hilo proxima.

Herba *pusilla, Ceylanica,* 6-8 *pollicaris aphylla, tenerrima, hyalina:* scapo *erecto spiciformi, sæpius dichotomo:* floribus *minutis, purpurascentibus.*

1. Hyalisma *Janthina, Champion.*

Hab.—Near Galle, Ceylon. Flowers in December to April.

Descr.—A minute *annual* plant, throwing out a mass of fibres from a root deeply seated in the earth, and after that a flowering scape which withers after fructification and is succeeded by a second scape; frequently having the two scapes together. Leafless and not lactescent; the scape furnished with alternate ovate bracteoles; the flowers spiked and in verticels of two to three flowers together, subumbellate; pedicels longish and bracted at base. *Scape* angled; bracteoles and bracts about a line long. *Flowers* minute, about a line to a line and a quarter in diameter; the lower usually female, the upper male; and in poor specimens, the flowers are occasionally all male. *Limb* of the Perigonium purple, patent, divided into 8-linear ovate segments.

Male flowers.—Stamina 4, opposite the alternate segments of the perigonium and attached to them by the filament: *anthers* large, peltate, whitish; when young somewhat 4-lobed, but when bursting spuriously 2-celled, and open their whole extent: *pollen* spherical. *Disk* fleshy and extending between the anthers. *Sterile ovary* none.

Female flowers.—Ovaries very numerous, seated on a convex disk, purplish and covered with pellucid glands, obovoid: *style* lateral, half as long again as the ovary, attached to its base, linear persistent: *stigma* pointed. *Fruit* the enlarged ovary, at length bursting from bottom to top and showing a naked seed. *Testa* hard, brittle, reticulated, one of the sides indurated by a prominent raphæ. *Embryo*

minute, lying next to the hilum at the apex of somewhat corneous albumen: *radicle* conical and somewhat curved.

APHYLLEIA. *Genus novum.*

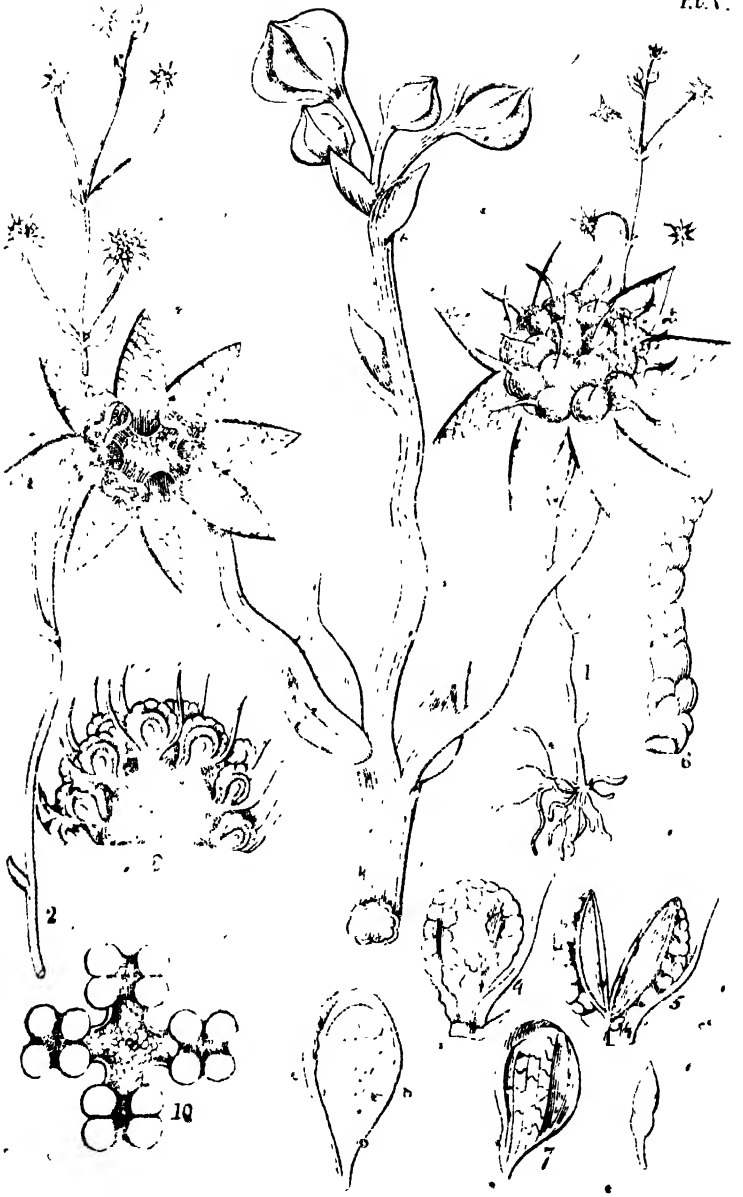
Flores hermaphroditi: *Perigonium* 6-partitum, lobis reflexis. *Stamina* 6, laciniis perigonii adnata et opposita: *Filamenta* brevissima: *antheræ* peltatæ bilamellatæ, lamellis toto ambitu solutis apertæ. *Ovaria* plurima receptaculo subconvexo imposita. *Stylus* lateralis, obliquus: *stigma* peltatum, radiatim multifidum. *Utriculi* plurimi basi verticaliter dehiscentes, membranacei, glandulis pellucidis tecti. *Semen* ovoideum: *testa* dura, fragilis: *raphæ* notata. *Embryo* inter albumen minimus: *radicula* hilo proxima.

Herba *pusilla, Ceylanica,* 3-4 *pollicaris aphylla, tenerrima*, scapo *erecto tereti, spiciformi, simplici vel dichotomo*: floribus *minutis erubescentibus.*

1. APHYLLEIA *erubescens, Champion.*

HAB.—Near Galle, Ceylon; in damp woods. Flowers from December to April.

DESCR.—A minute *annual* plant, with the root fibrous and bearing either one or two scapes, which are only three or four inches high and several flowered. Leafless and not lactescent, the scape furnished with several alternate and minute bracteoles. *Pedicels* moderate, arranged alternately on the scape and bracted at base. The *flowers* nodding, minute, from $\frac{1}{2}$ to $\frac{3}{4}$ of a line in diameter, with the limb 6-cleft. *Segments* of the *limb* subulate, reflexed when in fructification, persistent, purplish coloured. *Stamina* six, opposite the segments of the perigonium: *anthers* when young bilobate, when the pollen bursts opening right across, white. *Style* linear, lateral. *Stigma* peltate, black, radiately cleft. *Ovaries* and *utriculi* ovoid, sanguineous red and covered with pellucid glands. *Utriculi* burst-



Hyalisma Jamesiana J Champion

ing from the base upwards: *seed* solitary, hard striated, marked by an elevated raphæ, naked. *Embryo* with the radicle next the hilum at the apex of rather hard albumen. *Bracteoles* ovate, half a line long.

Gᴀʟʟᴇ: *June 1st*, 1846.

EXPLANATION OF PLATE, No V.

Hyalisma Janthina.

1. A specimen with male flowers only, showing the root.
2. A specimen with both male and female flowers.
3. Part of a flower much magnified.
4. An utriculus much magnified.
5. Ditto ditto burst.
6. A style much magnified.
7. A seed magnified.
8. Ditto ditto section showing the embryo.
9. Section of the fruit much magnified.
10. Anthers of a male flower previous to their bursting, also much magnified.

Description of the Wild Ass and Wolf of Tibet, with Illustrations. *By* B. H. Hodgson, *Esq.*

EQUIDÆ.

Genus Equus.—*Sub-genus* Asinus.

Asinus polyodon mihi. *Kiang* of the Tibetans.

Sp. Ch. Wild ass with two extra molars in the upper jaw, in front of the usual series. Summer coat close and shining; above clear antelopine-red; below, with the entire limbs and muzzle, flavescent-white. Mane, tuft of tail, and a dorsal line connecting them, brown-black. No trace of a cross on the shoulders. Winter coat rough and frizzled, like camel's hair, and the rufous hue of the upper parts deeply embrowned. This exceedingly wild, shy, fleet, and handsome species in-

habits the plains of Tibet, in herds of moderate size, composed of females and juniors, with seldom above one mature male, and oftener none, except in the breeding season. It is very common in all parts of Tibet: but the Tibetans are wholly unable to take it alive, though it is in high esteem amongst them for its beauty and fleetness. In size and proportions it bears a close resemblance to the Tânghan or Tibetan pony, but it is rather longer in the body, and does not stand quite so high on the legs, the bones of which are sensibly shorter. The head is thicker and weightier but not longer, the size is fully as large, the forehead is more arched: the ears are longer, being scarcely inferior in length to those of the tame ass: the limbs finer and deer-like, with longer laxer pasterns, and narrower, ovoid, hard, black hoofs: the tail is asinine, that is, nude with a terminal tuft of long elastic straight hair, which exceeds the true tail by above a foot and a half: the forelock and mane are sufficiently ample, the hair of the former being five inches, and that of the latter six inches in length: the mane is partially erect, and partly droops over the neck, and both forelock and mane are considerably frizzled, or crisp and curly: the limbs have the usual callosities.

The coat of the Kiang is close and glossy, as that of a well-groomed horse, in summer, but in winter it becomes longer, rougher, and curled, like the coat of a camel. The colour of the upper parts is in summer bright antelopine-red, but in winter this bright-ruddy hue is merged in brown. At all seasons, the inferior parts, including the lower part of the flanks, the posterior part of the buttocks, the entire limbs, the lining of the ears and the muzzle, are flavescent-white. And the mane, tuft of the tail, and a dorsal line connecting them, are always black-brown. So also are the tips of the ears outside. The hoofs are black, and the iris of the eyes bluish-grey; and lastly, there is no trace (in the five skins now in my possession) of the asinine 'cross,' though the

animal possesses most of the essential characters of that subgenus. The scull, as compared with that of the horse and mule, (I have no ass' scull wherewith to compare it) offers some striking peculiarities. In the first place, the dental formula is anomalous, exhibiting two extra molars which are small, ovoid, simple, and placed in front of the usual series.

In the Kiang the dental formula is as follows : $\frac{0}{6}$ $\frac{1.1}{1.1}$ $\frac{4.4}{6.6}$ Total 42.

In the Kiang moreover, the scull is more massive and weighty, exhibiting throughout more height as well as breadth, and its superior and inferior outlines are much less rectilinear; the rami of the lower jaw being much bent *up* towards the junction of the incisors, and the frontal and nasal bones being nearly as much bent *down*. The condyles of the lower jaw are less elevated, and the ascent to them from the posteal part of the rami is by straighter lines. The nasal, maxillary, malar, frontal, and parietal bones, have greater development; so that the senses, as well as the intelligence of the Kiang, ought to be quicker than those of the horse or mule. The encephalon is decidedly more capacious, and so is the nasal cavity in the Kiang. The frontals, both lengthwise and across, are more arched. And the nasals have a longitudinal groove along the mesial line. The zygomatic arches are shorter and differently curved: the orbits are fully as large or larger. The great foramen and its condyles are carried less far backwards, so that instead of forming the most posteal part of the scull (as in the horse and mule), they fall considerably within the perpendicular of the transverse or occipital crista. The incisors of both jaws are nearly erect in the Kiang, instead of sloping forwards or outwards as in the horse and mule; and lastly, the scull of the Kiang is much more suddenly attenuated towards the front or base of the incisors, where the breadth of the scull does not exceed that of the horse's scull.

Dimensions of a male and female Kiang, and of a Tânghan or Tibetan pony :

	Kiang.				Tanghan	
	Male.		*Female.*		*Male*	
Muzzle to anus, .. .	6	6	6	2	6	6
Tail, minus tuft, ...	1	1	1	0	1	1
Tail, with tuft, .. .	2	9	2	6	3	1
Head, length of, .. .	1	$8\frac{1}{2}$	1	8	1	$8\frac{1}{2}$
Ditto, extreme depth, ..	0	11	0	11	0	$10\frac{1}{2}$
Ditto, extreme width, .	0	$8\frac{1}{4}$	0	8	0	8
Ears, length of, .. .	0	$7\frac{3}{4}$	0	$7\frac{1}{2}$	0	$6\frac{1}{2}$
Height at shoulder, ..	3	9	3	5	4	1
Fore-leg, top of cannon-bone to point of hoof,	1	$3\frac{1}{4}$	1	$2\frac{1}{2}$	1	$3\frac{1}{2}$
Hind-leg, ditto ditto, ..	1	$1\frac{1}{4}$	1	1	1	6
Fore-hoof, length, .	0	$4\frac{1}{2}$	0	1	0	$1\frac{1}{4}$
——— width, ..	0	$3\frac{1}{2}$	0	$2\frac{5}{8}$	0	$3\frac{3}{4}$
Hind-hoof, length, .	0	1	0	$3\frac{5}{8}$	0	$4\frac{1}{2}$
——— width, ..	0	3	0	$2\frac{1}{2}$	less	4

	Skulls.			
	Female Kiang		*Male Tanghan*	
Length, from base of incisors to condyles of foram. mag.	1	$5\frac{3}{4}$	1	6
Ditto, from ditto to most salient point of occipital crest, ...	1	6	1	$5\frac{1}{4}$
Breadth (greatest), between extreme expanse of zygom. arches, . ..	0	8	0	$7\frac{1}{2}$
Breadth (least), between nearest margins of orbits, ...	0	$5\frac{5}{8}$	0	$4\frac{7}{8}$
Breadth of encephalon between temporals,	0	$3\frac{3}{4}$	0	$3\frac{1}{2}$
Greatest depth or height, ...	0	$10\frac{1}{4}$	1	$10\frac{1}{4}$
Base of incisors to fore-angle of orbits, ..	0	10	0	$9\frac{1}{2}$
Fore-edge of orbit to most posteal part of scull, ...	0	8	0	$8\frac{1}{2}$
Diameter of orbit, ...	0	$2\frac{3}{8}$	0	$2\frac{1}{8}$
Greatest breadth between outer margins of upper molar teeth, ...	0	$4\frac{1}{4}$	0	$4\frac{3}{8}$
Ditto between ditto of lower molars, ..	0	$3\frac{3}{8}$	0	$3\frac{1}{2}$
Interval between nearest incisor and molar upper jaw, ...	0	$3\frac{1}{4}$	0	$3\frac{1}{2}$
Ditto ditto lower jaw, ...	0	$2\frac{3}{4}$	0	$3\frac{1}{2}$
Teeth, ...	$\frac{6.}{6.}$	$\frac{1.1}{1.1}$	$\frac{7.7}{6.6}$	$\frac{6.}{6.}$ $\frac{1.1}{1.1}$ $\frac{6.6}{6.6}$

Remarks.—I possess five skins procured through the kind arrangements of Dr. Campbell in my favour. I have studied with attention what travellers and systematists say about the wild horses and asses of Tibet and its vicinity; but I find little satisfactory or even intelligible beyond Pallas' account of the Dziggatai, and to that I can only refer at second-hand. There is, I believe, no species of wild horse in Tibet, and only one species of wild ass, viz. the Kiang above described, and which appears much to resemble the Dziggatai, as described by Pennant after Pallas. The Dziggatai, however, is expressly stated to *want* two of the usual complement of equine teeth, whereas the Kiang unquestionably possesses two in *excess* of that complement. Moreover, the Dziggatai is stated to have a *flat* forehead; and the colours of its mane, tail, and body differ materially from those of the Kiang. Wherefore, I think the Kiang may prove a new species, and I have named it *Polyodon*, from its singularly anomalous dentition, having 7.7 molars in the upper jaw.

Colonel H. Smith alleges that the Kiang is the prototype of the piebald race of Tânghans, a mistake which can only be accounted for by a love of paradox and want of information on his part of all but the name of the Kiang. The Kiang possesses every mark of the sub-genus Asinus, as defined *by himself*, whereas the 'Ablac' breed of ponies, peculiar to Bootan, are horses every inch of them, differing entirely, even in colour, from the Kiang.

P.S.—Since the above was written, I have received two more specimens of the Kiang, provided with sculls, and both of these fresh sculls exhibit the 7th molar tooth in the upper jaws. There can be no longer question therefore that this excess is normal. Pallas cannot have been mistaken in regard to the dentition of the Dziggatai. His total of its teeth is 38, and, as the front and binary teeth are not apt to vary like the molars, the Dziggatai's dental formula must be $\frac{6}{6}\ \frac{1.1}{1.1}\ \frac{5.5}{6.6}$.

CANIDÆ.

Genus CANIS.—*Sub-genus* LUPUS.

Lupus Laniger mihi. The *Chángú* of the Tibetans. *Hab.* Tibet.

SP. CH. Wolf, with long, sharp face, elevated brows, broad head, large pointed ears, thick woolly pilage, and very full brush of medial length. Above dull earthy-brown; below, with the entire face and limbs, yellowish-white. No marks on the limbs. Tail concolorous with the body, that is, brown above and yellowish below, and no dark tip. Length four feet. Height two and a half feet.

This animal is common all over Tibet, and is a terrible depredator among the flocks. The great Bhotia mastiff is chiefly employed to guard against it. It has the general form of the European wolf; but its colour is very different, and it has more elevated brows, larger ears, and a much fuller brush. Its pilage is also dissimilar and unique. From this last circumstance I derive its specific name, having no doubt that it is a new species. The Chángú has a long, sharp face, with the muzzle or nude space round the nostrils prolonged considerably beyond the teeth, and furnished with an unusually large lateral process, by which the nostrils are much over-shadowed sideways, and nearly closed. The eye is small, and placed nearer to the ear than to the nose; the brows are considerably elevated by the large size of the frontal sinuses; the ears are large, and gradually tapered to a point from their broad bases, and they have the ordinary fissure towards their posteal base; the head is broad; the teeth large and strong; the body long and lank; the limbs elevated and very powerful; the brush extends to half-way between the mid flexure (os calcis) of the hind limbs and their pads, and is as full as that of a fox. The fur or pilage is remarkable for its extreme woolliness, the hairy piles being few and sparely scattered amongst the woolliness which are most abundant. The head as far as the ears, the ears

and the limbs, are clad in close ordinary hair; the belly is thinly covered with longer hairs: but all the rest of the animal is clothed in a thick sheep-like coat, which is most abundant on the neck, above and below. The longest piles (those of the neck) are above four inches in length: those of the body generally three inches to three and a half, and those of the brush the same. The woolly piles are half an inch to an inch shorter than the hairy ones. The longer hairy piles are fine and elastic as those of a delicate man or a woman. On the back many of them are entirely black: others have large black points, then a pale central ring; and lastly, a dusky basal one: others again have a dusky basal ring, then a very large pale one (flavescent-white), and a small black terminal one, which last gradually disappears as you descend the flanks, till on the lower surface the hairs become entirely white. The woolly piles on the superior surface are almost wholly brown, passing to yellowish-white as you descend the flanks to the belly, on which last part there are no piles of this sort. The ample brush has no dark tip, as in most other wolves, but is throughout concolorous with the body; the greatest portion however showing the prevalent earthy-brown of the back. The entire face and limbs are pale and unmarked. The outsides of the ears show a ruddier tint than is observable anywhere else, and these ruddy hairs are tipt with black. The general effect as to colour is, that the animal is dull earthy-brown above; yellowish-white below, and on the face and limbs. The following are the dimensions of an old *female*, procured with the scull complete:

	Ft.	In.
Snout to anus,	3	9
Height at shoulder,	2	4
Tail and hair,	1	7
Tail only,	1	4
Head, length of,	0	11
——, width of,	0	5¾
——, height of,	0	4¾
Snout to fore-angle of eye,	0	5
Thence to base of ear,	0	4¼
Ears, length of,	0	4¾

Dimensions of the scull (fœm).

	Ft.	In.
Extreme length, ...	0	$9\frac{1}{2}$
——— width, ...	0	$5\frac{1}{4}$
——— height, ...	0	$4\frac{1}{4}$
Greatest interval between upper molar teeth,	0	$3\frac{1}{8}$
Ditto lower jaw, ...	0	2
Symp. interm. to postcal edge of last molar, .	0	$4\frac{3}{4}$
Ditto ditto lower jaw, ...	0	$4\frac{3}{4}$
Symp. interm. to fore-edge of orbits, .	0	$4\frac{1}{4}$

Remarks.—To Dr. Campbell's kind arrangements I am indebted for a fine specimen of the wolf of Tibet, with the scull complete. It was a female and aged, as is proved by the obliteration of the sutures of the scull and by the worn state of the teeth. Eight teats only are traceable. No European, Asiatic, or American wolf that I am acquainted with, has the frontal sinuses so amply developed on the brows, consequently, so elevated as this species, whose scull bears a great resemblance to that of the Cábúl greyhound. Notwithstanding the size of the longitudinal and transverse cristæ, the walls of the encephalon have a considerable swell, leaving ample space for a good-sized brain; and the elongation of the face, that is so noticeable in the head with its integuments, is by no means equally striking in the nude scull, so that a good deal of it must be ascribed to ample development of the cartilaginous part of the nose, a feature which, added to the unusual size of the frontal sinuses, would seem to indicate considerable powers of scent in the living animal. There are no wolves in the Sub-Himalayas. In the plains of India, as of Tibet, they abound: but the species proper to the plains of India is very different from that proper to the plains of Tibet above described. Throughout India and its vicinity, wolves appear absolutely to eschew the mountains, and so also, generally speaking, do jackals and foxes.* These

* Pearson's vulpes montanus, confined to the vicinity of the snows, is an exception rather proving than disproving the rule. It is commoner in the plains of Tibet than in the Himalaya.

wild Caninæ are represented in the mountains by the so called wild dogs, not feral Pariars, which exist only in the imagination of H. Smith, but Búánsús or Dhóls, of which our *Cyon primevus* is the type. H. Smith's definition of this type, which he calls *Chrysæus*, is many months posterior to mine, and is likewise inaccurate. The true marks of the type are the deficient molars and the excessive number of the teats. In regard to the former point some doubts have been raised; wherefore I beg leave to state, that I have examined at least thirty sculls of the Búánsú of all ages, from four months to twice as many years, without finding the least variation; that Dr. Bramley assisted me in the examination of several of these sculls, reluctantly, but fully satisfying his scepticism by means of laying bare the supposed site of the wanting tooth; and that I have similarly examined very many sculls of Pariars, sporting dogs, jackals and foxes, and yet never found a trace of that variability in the canine dental formula, which has been alleged in order to prove the Búánsú's dentition an accidental or trivial circumstance. In the present paper I have brought to light an anomaly in equine dentition. Will this also be denied or declared to be an unimportant and casual vagary of nature? Truly, if osteology may not be trusted in our science, I wonder what may be, though I need not be told, that even osteology has its anomalies.

Darjeeling: November, 1846.

Observations on the medical effects of a partial Obstruction of the Circulation. By THOMAS A. WISE, M. D.

The frequency and general danger of the diseases of tropical countries, and the rapidity with which they advance in their course, often reduce the system to such a state of debility, as to prevent the employment of remedies with sufficient celerity to ensure the desired effects; and even when

this is accomplished, and the patients life saved, his constitution is often so greatly enfeebled by the means adopted, as to render him afterwards enervated and more subject to disease than before. The following pages are descriptive of an attempt to remedy such a result, by means of a plan of treatment, which I have no hesitation in stating will be found both simple and efficacious.

A large class of fevers, the fatal cholera, certain local inflammations, and various other diseases of tropical countries are produced, or very much modified, by morbid changes in the circulation or internal congestions. By stopping the passage of blood in the part, or in one or more extremities, the circulation will be retarded, so as to modify its action on the diseased part, or blood in the system will be accumulated in the internal organs, as it passes through a diminished circle. The unequal and morbid distribution of blood in the internal organs which occurs in intermittent fevers, cholera, &c., is counteracted, and by this means a new and powerful action is produced, diminishing internal congestions, and modifying, if it does not check the disease, by hastening the warm stage under more favourable auspices.

I was led to this train of thought by the perusal of a fragment of a pamphlet entitled "Observations on the medical effect of compression by the tourniquet in cases of agues;" which I found bound up with an old volume of Medical Essays. It is without the title page, and although in the form of two letters, there is unfortunately no signature appended to them. I have likewise noticed, that in some cases the same method has been adopted by the Hindoos for removing pain. In one case, a native subject to colic (sool) and fever from indigestion, was in the habit of applying a ligature tightly round his arms and legs from the axillas and groins, to the wrists and ankles. In that state he lay down, and in a few minutes the pain and feverishness disappeared. In other cases of rheumatism of the head or extre-

mities the natives tie a ligature round the affected part with the effect of removing the pain. A second useful application of pressure is to increase absorption in swelled parts. The following is an example of such an application which I insert here, as it may be often used with advantage for the cure of those swellings which constitute the disease called elephantiasis.

Mirza Hyder Buksh had been for many years afflicted with an enormous enlargement of the scrotum, which he had reduced by means of pressure. The swelling was still of the size of a man's head; which, however, he attributed to the fever which he had had the night previous. Before applying the bandages he rubbed a small portion of a slightly irritating ointment over the enlarged scrotum, and the swelling was supported by a towel, the two corners of which were tied on each side, to a broad belt which had been tied round his waist. Pieces of flannel were next placed so as to prevent friction, and at the same time exclude the extremities of the penis. A long piece of broad tape encircled the swelling, and was applied tight from above downwards. So rapid was the effect of the pressure upon the swelling, that the bandage became loose, and required to be made tight twice or thrice during the day. By a continuance of this pressure the swelling was soon reduced, and with a little care and attention the cure was rendered permanent.

The intention of the following remarks is to exhibit the most advantageous manner in which a partial obstruction of the circulation may be employed in the cure of certain diseases. For convenience, I shall arrange them under different heads, with reference to the application of the treatment to accidental, symptomatic, and specific diseases.

Section I.

Accidental Congestions in which the tourniquets may be employed.

The movements and the local determinations of blood in parts are regulated by forces in the capillary vessels, independent of the action of the heart, which exercise an important influence on nutrition, and on the secretions in the part as well as its sympathies with other organs. This local congestion, or loss of balance in the circulation, sometimes occurs at particular periods of life, and in different parts and classes of vessels, and under various states of health and disease. The acute form of congestions is produced by a certain degree of stimulus to the vessels of the part, from the influence of the cause upon the nerves, or their connection with the part affected. This cause may be mental emotions, which affect particular organs or parts, through the nervous system; as in blushing, &c. This form of congestion is attended with unfavourable effects when the organ is important, or the disease severe; when it produces symptomatic fever, and an increased secretion in the part, or hæmorrhage; and in some cases, when it obstructs the function of the brain and other organs.

The treatment of congestions will depend upon their cause, their degree, and particularly their nature. When the disease is superficial, the rapidity with which the blood returns to the part, in a state of congestion, indicates its degree of acuteness. This is found to exist in every degree, until we arrive at the state of inflammation. Such variations necessarily require a corresponding modification in the remedies employed for the removal of all disease, or if the constitution is strong and healthy, the congestion will yield to the natural powers of the system; but under less favourable circumstances, it will require medicine for its removal.

One of the remedies usually employed is topical bleeding, which, by relieving the vessels of their contents, gives them an opportunity to contract; and by the reaction, to return to their natural state. In like manner blisters act by relieving the distention of blood, and stimulating the weak vessels to action, but a much more simple and certain remedy, in these cases, is the application of a ligature, so as to retard or stop the circulation in the limb in which the morbid circulation exists, and thus introduce a new action in the part. This may likewise be effected in some internal diseases by stopping the circulation in one or two limbs, which throws more blood into the trunk, and thus removes the topical congestion.

The following experiment was made upon a strong, healthy, young man, to ascertain the effect of obstructing the circulation in health; when the temperature of the air was 85°, the pulse at the wrist 80°, and the temperature of the body 98°. The tourniquets were applied to the thigh and to the opposite arm; and in a few minutes the limbs became cold, and numb, but soft and flexible. The temperature of the hand on the side to which the ligature was applied fell to 93°, and in the axilla beyond the ligature to 97°. The other parts of the body after the ligature was applied appeared much warmer than before, and a perspiration covered the skin; pulse 88°, while the temperature of the axilla was 102°. In five minutes after the ligature had been applied to the limb, the heat of the surface and pulse of the remainder of the body increased in velocity by twenty beats in a minute, so as sometimes to cause a flushing of the face, anxiety, and frequent respirations. In six minutes the obstruction of the circulation induced a tendency to syncope as in a plethoric person. Immediately on the removal of the obstruction, these symptoms disappeared, and the pulse fell below its natural standard: and in an hour after, it is often ten beats slower than it was previous to the application. Thus the effect of obstructing the circula-

tion is to increase the momentum and velocity of the blood; which being arrested in its passage, little blood is left in the limbs. The morbid internal distribution of the circulation is thus arrested, internal congestions are disturbed, and eventually removed, by the increased quantity of blood which now circulates with greater velocity through the parts not compressed, and a mild warmth is produced, followed by a retardation of the circulation. By this means morbid actions may be modified, and eventually checked.

By employing a field tourniquet, and producing a less degree of pressure, the arteries may be allowed to convey blood to the limb, while the return is more effectually barred by the pressure of the ligature upon the more superficial veins; by which means the internal morbid circulation is relieved, and much more blood is retained in the limbs than before. Thus great relief is obtained in many internal diseases, more particularly of the head and chest, by this sudden abstraction of so much blood from the circulation. I shall only mention cases of apoplexy, hæmoptysis, tetanus, &c. as examples of disease in which this mechanical remedy may be employed with great advantage.

A therapeutical agent of such power, and so easily managed, will be of great use in removing many diseases in the large and important class of symptomatic congestions, which I shall next consider.

Section II.

Symptomatic Congestions.

A certain degree of local irritation produces a determination of blood to various organs, and often occasions formidable functional disorders. As this state is peculiarly under the salutary influence of medicine, it is of very great importance to distinguish it; and to use the proper means of correcting

it, as such congestions will pass on to inflammation, and lay the foundation of some of the most fatal diseases. The lungs, brain, liver, and spleen, the tegumentary tissues, and sometimes the serous membranes are liable to be so affected, and in all such diseases there is sooner or later so great an accumulation of blood in the parts affected, as to produce considerable disturbance in the functions of the part, and to require prompt and careful treatment for their removal.

Whatever debilitates the tonic powers of vessels, renders them more susceptible of the influence of malaria, which produces congestions of organs. Such causes are—a residence in unhealthy climates and situations; living on poor food; great fatigue; long watching; grief; exposure to cold; sleeping in damp rooms or beds; the use of some medicines, as mercury, by first increasing irritability, is followed by great weakness of the system, in which state congestions are liable to occur. The fever developes itself on exposure to cold, while the system is under its influence, producing a congestion in one or more organs, which become oppressed, while there is at the same time a diminution of vital power, or the cold stage of fever is produced.

These congestions frequently take on an intermittent form from the peculiar state of the vessels of the part. The symptoms recur in paroxysms until the vessels return, by reaction, to their natural condition. Persons once attacked are very susceptible of relapse from very slight causes, which favour the recurrence of the internal venous congestions.

The premonitory, or forming stage of fever, includes the period intervening between the first deviation from health, from the injurious impressions of inanimate or other causes of fever, and the commencement of a febrile paroxysm. This important latent period is not always very definite. Most patients first feel languid and tired with loss of appetite; they complain of slight head-ache, and aching pains in the loins and bones of the limbs. This state lasts from one to ten days.

and a paroxysm of the symptoms occurs about noon, and terminates in a rigor, which proves the commencement of the paroxysm of fever. This first attack assumes the type, from which the other forms of intermittent fever are supposed to be derived. Should the febrile state be increased twice a day, so that a fresh attack occurs before the previous attack had subsided, it forms the remittent fever; from which the remaining continued type is deduced in which the remission becomes gradually less distinct. This continued, or more severe form of fever, as it diminishes in violence, has a tendency to take a regular or an irregular form, and at last intermissions occur. These remarks regarding the nature of fever evince the propriety of varying the treatment to be followed, and by observing the premonitory symptoms, the physician by the judicious employment of remedies, will be enabled to render the disease milder and less dangerous; whether it arise from the impression of cold, or from a contagious source. In both cases the first symptoms that declare themselves are much the same, and they will pass through their course varied under different circumstances, unless these symptoms are checked, or the fever cut short. This has been attempted to be done by the violent action of medicine, such as a full dose of tartar emetic, the sudden shock of the cold affusion or a large bleeding, so as to enable the constitution to throw off the disease; but these methods are now considered dangerous, and are very rarely had recourse to.

The first symptoms observed of an attack of ague are a feeling of langour, a sense of debility and sluggishness. in some cases nausea, and vomiting of bilious matter, an aversion to food, and a diminution of the secretions. The face of the patient becomes pale, the features and external parts shrink, and the skin becomes constricted. The person feels very cold; rigors come on, with pain in the back, head, loins, and joints; the sensibility is impaired, the thoughts confused; the pulse is small, frequent, and often irregular; and the

respiration short, frequent, and anxious. In some few cases drowsiness and stupor have prevailed in so high a degree as to resemble coma or apoplexy.

This cold stage is succeeded by the hot stage which is ushered in by a decline of the above symptoms, followed by an increase of heat over the whole body, and this is, in its turn, succeeded by perspiration, or the sweating stage.

In different individuals a considerable variation may be observed, both in the severity of these symptoms, and in the mode of succession, and the stages may be in different proportions of duration to each other. In some cases such a prostration of strength takes place as to endanger the life of the patient. In general however the disease is rarely fatal when the interval between two paroxysms is distinct and of considerable length. But even in these cases the person becomes weakened by the repeated paroxysms, which occasion a loss of appetite, flatulency, and other symptoms of indigestion, enlargement of the spleen, and its distressing consequences, and of the liver, followed by dropsy, and general debility. Such attacks of fever may terminate in chronic organic diseases, though in some instances the fever changes from the intermittent to the remittent and continuous forms, which often prove fatal, unless the patient removes to a more salubrious climate. It is therefore of the greatest importance to cut short the ague as soon as possible.

The usual directions given for the treatment of ague are empirical and uncertain; and the disease is so very distressing in tropical climates as to deserve a careful consideration. The stoppage of the circulation in one or more limbs is the most simple, yet at the same time a powerful therapeutical agent in the case of intermittent fevers, and forms a striking contrast to the usual feeble and ineffectual method of the application of warm clothes, heat, and internal stimulants. These, it is true, diminish the distressing feeling of cold, and

hasten the accession of the warm stage, but are much less effectual than the plan of obstructing the circulation. Dr. Macintosh, of Edinburgh, recommended blood-letting in the cold stage, on the principle of diminishing its duration, and hastening on the hot stage, while at the same time its violence is decreased. This effect it produced, by lessening the mass of the blood, and dispersing morbid local congestions. The same method was energetically employed by the late Dr. Twining, who proved that such a loss of blood had the effect of favourably modifying, and even of checking intermittent fevers. But it had the great disadvantage of weakening the system; and thus increasing the tendency to relapse, an event so common, as in many cases to render it necessary for the patients to proceed to a more congenial climate, in order to restore the vigour of the constitution. The general results of the numerous cases in which I have stopped the circulation for the cure of ague were, that when the tourniquet was applied to one of the extremities, previous to the accession of the paroxysm of ague, known by the premonitory symptoms, the cold stage was entirely prevented, and a slight attack of synocha followed; and that when applied at any time during the cold fit of an ague, in two or three minutes after, a modified warm stage was induced, which was rendered milder and shorter in its duration, and more easily brought under the influence of medicine; and when the attack was accompanied with pain in the back or headache, these symptoms were speedily removed. The following cases are given as favourable examples of the usual effects of the tourniquet in cases of simple ague.

Case I.—Bisto Sunder Bhutacharge, aged 40, has had a quotidian fever for seven days. The tourniquet was applied on the morning of the 4th August, when he had no fever. He felt faint after it was removed, and this feeling was succeeded by

heat of the surface which went off towards evening. He had no return; and has applied to-day (13th August), at the hospital, on account of another complaint.

Case II.—The following is a case of ague in an officer in the H. E. I. Co's. army. At the latter end of July he was attacked with fever, probably from sleeping in a low, damp bungalow, from exposure to the weather, and irregularities in living. "I suffered," says the patient in his account of the disease now before me, "for three successive days from attacks of fever and ague, the fits commencing regularly at 11 o'clock A. M., on the two first days the cold fit was very slight, but fever, accompanied by severe pains in all my bones and joints, remained till evening. On the third day I experienced a severe attack of ague at the usual hour, and immediately sent to the Native Doctor to come over with the tourniquet, as recommended by you. He came in ten minutes, while I was shivering violently, and applied a tourniquet round the left thigh, and one round the right arm. They were kept on for seven minutes. The shivering ceased immediately, and was succeeded by a mild fever, without any pains in the limbs, which accompanied all my former attacks. This occurred upwards of a month ago, and since then I have not had the slightest recurrence of the complaint, although for a long time previous I had been subject to constant attacks." He continued to reside in the same house during a most unhealthy season with impunity.

Case III.—A respectable Mussulman, aged 40, residing in a country-house which was low, damp, and surrounded by jungle and tanks, was attacked with a quotidian fever, which increased in severity, and on the eleventh day it was so severe as to endanger his life. The intermission was still marked. I administered a purgative and saline mixture on-

the accession, and a dose of quinine in the interval. The next day during the cold stage, the tourniquet was applied for ten minutes, and when he complained of a dizziness in his head, it was removed. The cold stage was quickly succeeded by a gentle heat, which continued during the day, and terminated in a slight perspiration.

26th July.—He had slept well; and his skin was warm and perspiring. He complained of thirst; his tongue was dry in the centre; pulse small, soft, and slow.

29th.—There has been no return of fever, and he is gradually gaining strength under the use of tonics and aperients.

25th August.—Quite well; had no return of fever after the first application of the tourniquet.

10th October.—Continues well.

The complication of intermittent fever with local affections, more particularly with enlargement of the spleen, is very common in Bengal, and renders the cure, in many cases, more difficult; and a more frequent employment of the tourniquet is required than in the simple forms of ague.

Case IV.—Sunker, aged 30, was admitted into hospital on the 13th July, in the hot stage of a tertian fever. Spleen enlarged; the tourniquet was applied for ten minutes in the cold stage of an attack. It immediately put a stop to the cold, and the hot stage which followed, was short and very mild, but was succeeded by a feverishness, which continued during the night. Bowels three times affected; next morning the skin was cool, and the pulse soft and 62.

The paroxysms were thus cut short twelve times with the same result, only that the hot stage and the fever went off towards night; and in one of these occasions, I found the pulse next morning soft, and 48. On the 3rd August he was discharged quite well, when no enlargement of the spleen could be perceived.

Case V.—Kumurudeen, a ryut, aged 20, called to-day 12th Sept., on account of a venereal disease he had contracted: having been cured of a quotidian fever by two applications of the tourniquet. When he first applied for assistance at the hospital he had an enlarged spleen, which was cured by obstructing the circulation. I afterwards carefully examined this person, but I could not feel any traces of it remaining.

In the state of fever in which the intermission is less marked, the employment of the obstruction of the circulation is not always of such advantage as in the more simple form. Still it is of very considerable use when employed during the remission; by weakening its power, and modifying, and at length removing the disease, and may be adopted as an auxiliary to the ordinary methods of treatment for curing the disease.

Attacks of ague sometimes alternate with attacks of dysentery. In such cases physicians must vary the treatment according to the urgency of the symptoms, and the patient should remove from the locality in which the disease was contracted. In many cases of this complex form of disease mercury will be found of use in removing it.

The following is the result of a case of remittent fever, which, after being treated for some days, assumed the intermittent form. I then had the tourniquet applied, and the following is the result in the patient's own words: "On the 23rd instant (August), whilst in the cold stage, I sent for one of your assistants, who immediately came and bandaged my left arm and right thigh. A change was soon felt, inasmuch as a certain degree of warmth was generated, which subsided gradually on the bandage being removed, carrying off the fever along with it. I have not had a return since, and now attend to my duties at the College."

The above patient should have stated, that he returned to his duties as teacher in the College the day after the tourniquet was applied, and had no return of fever.

When in charge of the 5th Regt. N. I., my duties as Civil Surgeon obliged me to reside at a distance from the cantonments, and being under the necessity of relying on native assistants to apply the tourniquets in my absence, I found that they frequently applied them when the hot stage had commenced, or before a complete remission had occurred, and a modified fever followed, which resembled the synocha of Cullen. In all such cases a diminution of the febrile symptoms was the consequence; which were very well marked after the tourniquet had been removed, though the fever usually continued during the night, but was rarely perceptible next morning. I never saw any bad result; the fever seemed changed in its character, the pains in the limbs and bones ceased, and cuticular heat was felt over the body which was warm and dry. In many cases the disease is effectually cured.

I have now before me the particulars of 77 cases of intermittent and remittent fevers, all of which were very much benefitted or entirely cured, by the employment of the ligature: of these—

27* were cured by one application.
26† by two or three applications.
19‡ by from four to six applications.
5§ by from seven to ten applications.

Total .. 77 cured by the application of the tourniquet.

Congestion of the Spleen.

The favourable effects produced on fever and its sequelæ, the congestion of the spleen, which is often so rapid in its growth and dispersion, induced me to try it in cases in which this organ was enlarged without any fever.

* 11 of these uncertain.
† 4 Uncertain.
‡ None uncertain.
§ One uncertain.

The spleen is indeed not so directly in the course of the circulation, as to cause an immediate effect upon the organ; but still, the agent employed is so powerful, that I had little doubt of its ultimate effect. I was careful to select cases in which the spleen had been recently enlarged, and with little thickening of the parenchyma of the organ. The following is the result of the experiments.

In nine cases I applied the tourniquet in cases of engorged spleen without fever. In all the cases there was benefit derived from the remedy; the spleen became softer and smaller. Two of these cases were cured by the application of the tourniquet. Three applications of the tourniquet were made in one, and four in the other case; and seven patients were in a fair way of recovery by a continuance of the treatment.

Elephantiasis.

This is a common disease in Bengal; and often recurs for many years before it acquires the great size it sometimes assumes, when it is usually known by the name of elephantiasis. In its primary form, it is called by the natives "*Ganger*" or "*Saket*;" when it is supposed by them to be produced by the influence of the energy of the water over the other corporeal elements. It commences with a feeling of indigestion, and general uneasiness; a tenderness and pain of the groin or axilla, succeeded by a feverish state, in which the skin is hot and dry. This fever has a daily exacerbation, which increases on the second and declines on the third day, and is succeeded by pain, and swelling of one of the arms, or feet and legs. The bowels are sometimes constipated, at other times relaxed. The scrotum is sometimes affected in the same way. These swellings sometimes take place at the upper part of the thigh or arm, with more pain but less swelling than when they occur in the extremities of the members. That of the arm is often in the inner side, and extends in an oblong form to half the length of the arm.

It continues the same as that of the leg, unless when it terminates in a painful hardness which suppurates. Supposing that the tourniquet might be employed with advantage by diminishing the quantity of blood sent to the limb affected, and by increasing the mass in the rest of the body, that the morbid action might thus be removed, I applied it in the following case.

Case VI.—Petumber Doss, aged 23, has his left leg twice the size of the other from elephantiasis. He had likewise a large discharge of serum from a number of pustules which had formed on the swollen part. The periodical fever was stopped by the ligature. He slept after this, and next morning was quite free from fever. Had no return of fever for a considerable time afterwards.

Ephidrosis, or Burning in the feet and hands.

This is a very common endemic complaint in the moist plains of Bengal, and attacks all ages and both sexes; but it is most common in persons engaged in sedentary employments. In the dry sandy plains of Upper Hindoostan, it is never seen. There are two varieties of the disease, the moist and the dry; the former being most commonly seen in the young, and the latter in the old.

The burning in the hands with moisture generally attacks individuals at an early age, and in some cases appears to be hereditary. In this variety, the paroxysms come on periodically, but they are produced at any time on any cause agitating the body, or accelerating the pulse. Thus I have seen a youth standing before me, and exerting himself mentally, attacked with a paroxysm of the disease so severely, that large drops of perspiration fell rapidly from the extremities of the fingers. When the part is wiped dry with a cloth, it again becomes bedewed with moisture. Before this takes place, the person feels a hot burning sensation in

the hands and feet, followed by copious perspirations, which extends to the sides, and in a less degree to the backs of the hands. The right hand appears to be more affected than the left, and these again more than the soles of the feet. This disease is more troublesome in hot than in cold weather; and when the health is impaired by any cause, particularly when the bowels are relaxed.

This disease is not only distressing in itself, but not unfrequently prevents the person affected with it from following his trade or occupation.

The dry fever of the feet occurs more frequently in the old and debilitated, who have been afflicted by disease, more particularly with fever and bowel complaints. Under such circumstances the European is not exempt from its attacks, which are of a most distressing nature, without exhibiting any appearance of inflammation or disease of any kind. It exists in very different degrees of severity; from an uneasy sensation of heat and tingling to a severe burning feel in the soles of the feet. The burning pain often becomes excruciating, and sometimes extends along the leg, which prevents sleep, and deranges the digestive organs, and the general health.

The paroxysms take on a remittent or intermittent form; and a paroxysm is liable to occur, on exposure to the exciting causes.

In these cases, the very important perspiratory function which the skin performs in tropical climates, is deranged, more particularly in the soles of the feet and palms of the hands, where the thick cuticle and the diminished force of the propelled fluid prevent such a free circulation, as in other parts of the body. When the system is deranged, such a degree of debility will be the consequence as will predispose him to the disease. Should it occur in the young, the activity of the arterial system is likely to produce copious perspirations soon after the burning feeling is experienced.

and this local discharge will be produced by any of the usual exciting causes which accelerate the circulation by which the distressing symptoms will be relieved. The second or dry variety is by far the most distressing, and from the nervous capillaries being more particularly affected, the paroxysms of burning are very severe, and extend in twitches to some distance along the limb. The exposure of the poor to vicissitudes of the weather, and the use of a meagre and indigestible diet, render them more subject to the disease than others under different circumstances.

The above remarks on the nature of the disease will enable us to understand why local remedies will not be of more than temporary use, and will explain the method of treatment which should be considered in a two-fold aspect, as palliative and curative. To the first class belong absorbent earths to allay the distressing symptoms, to arrest the perspiration with warm fomentations and anodyne oleaginous frictions, to soften the skin, to promote the circulation, and to allay the pain. The method of exposing the feet and legs to the fumes of milk sprinkled upon the leaves of mudar is often of temporary use. This should be repeated daily, when the cure is said to be rapid and complete.* A more effectual means of stopping a paroxysm will be found in arresting the circulation in the limb for a time, which will remove the distention of the capillary vessels; thus interrupting the habitual course of the disease, and enabling the practitioner to employ medicines and diet, so as to obtain a complete cure. This will, in general, be effected by a nourishing and easily digested diet, with stimuli; and the employment of an alterative course of calomel, which, in many old cases, will require to be carried to gentle ptyalism. In such cases the same nourishing food should be employed with tonics.

* See Transactions of the Medical and Physical Society of Calcutta, Vol. ii. p. 275.

The following case is given as affording a description of the usual course of this distressing disease, in the words of the patient.

Case VII.—Callykissore Chatterjea, a large and strong youth, aged 19: states—"I have been afflicted with this complaint from my infancy, and it seems to increase as I advance in years. No member of my family has had this sickness, with the exception of my youngest sister. The intervals of the attacks are diminished, but during the cold months it is not so troublesome as it is during the rest of the year. In the hottest days, the perspiration from the palms of the hands and soles of the feet, is so copious, that I cannot employ myself in reading or writing, sometimes for a whole day. The perspiration on such occasions drops from my fingers for hours. At night, and during damp and rainy days, it is not so troublesome, nor occurs so frequently. During the hottest time of the day, I feel a burning sensation in my hands and feet. In the mornings and nights the hands and feet are of the same temperature as the other parts of the body, but as the day advances, the heat of these parts increases.

22*nd June.*—Compressed the humeral artery for six minutes; the veins were allowed to swell out, when the arm felt benumbed, cold, and livid.

23*rd.*—Compression for twenty minutes; numbness and uneasiness from the stoppage of the circulation.

24*th.*—Better: perspiration in the hand yesterday diminished. Again applied the tourniquet for the same time as yesterday.

8*th July.*—Better: the palms still perspire. Temperature of air 83°, pulse before experiment 82; after the ligature had been applied some time, the temperature of the hand of the compressed side was 88°; in the axilla beyond the ligature, 97°; in the opposite axilla, 99°.

8th Sept.—Saw this patient. He thinks the application of the tourniquet has been of much use in diminishing the perspiration in the part. A continued application would most probably have permanently cured the disease; but the young man has not patience enough to persevere.

Section III.

Specific diseases accompanied with congestions.

In treating of diseases produced by peculiar or specific congestions, some remarks will be offered on rheumatism and gout, cholera and exhaustion.

Congestions of blood in Rheumatism and Gout.

These diseases are of frequent occurrence, modified somewhat by the climate and other causes. Rheumatism in tropical climates is a difficult disease to treat; the symptoms being more violent, and the treatment more difficult than in temperate climates; whereas gout is only found among the luxurious in large cities, and is generally a more simple and less fatal disease than in Europe.

The most severe form of rheumatism is that which attacks particularly the periostium of long bones, and it is particularly severe at night. In many cases I could trace no connection with it and venereal disease: indeed, in some cases, there was no reason to suppose such a combination

The effect that obstruction of the circulation produces, is to remove the severe pain in the limb beyond the ligature. The pain recurs on the removal of the obstruction; but in a modified degree, and by a repetition of the ligature, it gradually decreases, and at length entirely disappears.

Case VIII.—Gopaul Sing, aged 25, was admitted into hospital on the 3rd July, with a severe attack of rheumatism in the knee-joint. The tourniquet was applied for seven minutes, which stopped the paroxysm; next day he felt so well that he could walk about.

4th.—As the pain returned, the tourniquet was again (5th) applied for 15 minutes, when the pain ceased, and the patient could walk about: pain increased during the night, and now (6th) he complains of pain in both ankles. Again applied the tourniquet with excellent effect. A slight return of pain in the evening.

7th.—Much better; still a little pain in the ankles.

8th.—Pains slight, confined to the feet and two ankles.

26th.—Pains much decreased; still weak; now only a slight pain in the foot. 13th. Well. The ligatures in this case were of great use in removing the pain and in curing the disease.

Case IX.—Baguban Chunder Banerjea, aged 23, has been suffering for a year and a half with rheumatism, which has quite unfitted him for study, or for gaining a livelihood. It first appeared as sciatica, then it attacked the knee, and lastly both heels, where the tendo-achilles is inserted into the os-calcis. He moved about with great difficulty and pain. When at rest he had less pain. The tourniquet was applied to the right leg, which immediately removed the pain, and he could stand without uneasiness. He had painful attacks of lumbago, which were relieved by narcotics, &c. and the occasional application of the tourniquet. This certainly removed the pain, and diminished the severity of the disease.

Cholera.—The difficulty of assigning a cause for certain diseases is sufficiently evidenced by the new theories continually proposed, and new remedies recommended for their removal. In none is this better exemplified than in the fearful cholera; the attacks of which are so sudden, and the symptoms so peculiar, as to require the careful consideration

of the physician. Among these are the remarkable changes in the blood from the escape of the serous parts into the alimentary canal, and the extreme thickness of what remains in the veins; which renders its circulation extremely difficult, and produces that congestion in the heart, as well as in the head and portal system, which forms such a remarkable feature in that disease.

If the unusual determination of blood to the alimentary canal can be checked or modified, it will probably strike at the root of the disease, and this can best be done by the application of the ligatures to the extremities, by which more blood is sent into the interior. The morbid congestions are thus removed, and the painful cramps of the extremities being stopped, there is an accession of heat in the trunk which modifies the disease, and allows time for medicines to act. This theoretical notion I had soon an opportunity of testing, and the result was highly satisfactory. This is best seen by examples, of which the following are a few.

Case X.—Hunoman, aged 25, was brought into the city hospital on the 15th July, after several evacuations, which had reduced him very much. No pulse at the wrist, and severe cramps in the legs. A cholera pill, with some of the mixture, was immediately administered; hot bricks applied to the feet, and oil rubbed over the body. The tourniquet was applied for ten minutes, which immediately stopped the cramps, and improved the pulse. Pain of the abdomen at times severe with restlessness. This pain appeared not to be affected by the ligatures; the pulse however improved, and the cramps of the legs were completely and permanently removed.

18*th*.—Well: left the hospital.

Case XI.—Noor Mahomed was brought to the hospital labouring under cholera; purging and vomiting; skin cold,

and no pulse at the wrist. The tourniquet was applied to a leg and arm; a sinapism to the abdomen, and cholera mixture administered. These means produced an amelioration of all the symptoms; the purging and vomiting ceased, the heat of the body increased, and he slept most comfortably. Was well next day, and has continued to get stronger: on the 8th he was discharged quite well.

I soon saw the necessity of retaining the tourniquets permanently, leaving one free for a time, and again putting it on, so as to avert the collapse, which follows the removal of the ligature, and thus retain the increased strength, which the diminished circulation had produced. The following is the result.

Case XII.—Gunga Sing, was brought to the hospital at noon of the 23rd October, in the collapsed stage of cholera. There was very great anxiety and restlessness; no pulse at the wrist, and great thirst; no vomiting nor purging. The tourniquets were applied, and the body became warm, while the extremities remained cold.

24th.—The tourniquets were continued all day and night; at times they were slackened, and they have been removed some hours this morning; body warm; extremities cold and dry. The eyes continue much sunken, turned upwards, inanimate, and filled with white mucus. Very anxious and restless; pulse small and very weak after the tourniquets were applied. Temperature of the body 100°. He complained of the tourniquets, and at last removed them.

25th.—Still anxious and restless, with 24 respirations in a minute; in other respects better. His look much improved; eyes more animated and clearer; has appetite, and has eaten some arrow-root; but will not allow the tourniquets to be applied. They seem to irritate him, and having discovered the method of loosening them, he does so without hesitation. The circulation being left free, he rapidly got worse, although all the usual remedies were employed for cholera,

such as heat, friction with stimulants, narcotics, and calomel, &c. internally.

26th.—He died during the night.

This was the first case in which a continued application of the tourniquet was attempted, and although the result was unfavourable, it satisfied me that the tourniquet was a very valuable remedy in this most fatal disease. This seems to be proved by the following cases.

CASE XIII.—Ducus Sing, aged 30, was admitted yesterday afternoon into the city hospital, in the collapsed stage of cholera. He had vomited, and his motions were scanty and like *conjee;* body cold; pulse soft and accelerated, probably from the exertion of being brought to the hospital, but it soon became imperceptible; his eyes became sunk and lifeless. Narcotics, and the usual stimulants were employed without effect, and he continually complained of thirst. The tourniquet was applied to the arm and leg, and the pulse immediately rose, and the warmth of the body increased. It was continued, but was loosened several times by the patient; and during the night was removed altogether. Morning—cold; eyes sunk; pulse imperceptible at the wrist; thirst less. In this state when the temperature of the air was 86° and that of the axilla 96°, I applied the tourniquets, and in five minutes the pulse became full, soft, and 112° in a minute; the temperature somewhat increased; in the axilla 97°; feels better; wishes to eat.

30th.—Three white motions after ten grains of calomel and one grain of opium; secretion of urine free and well coloured. Sleeps well; pulse full; skin cold.

31st.—Four leeches applied last night to the temples; which diminished the determination to the head. The patient feels well, and wishes to go home. I have recommended him to remain two days longer.

2nd November.—Left the hospital well.

Case XIV.—Sadu Mistree, aged 30, was admitted into the hospital on the 23rd October, in the collapsed stage of cholera; pulse imperceptible; has vomited and voided white *conjee* stools. The tourniquet was applied to the arm and leg, and kept on permanently; or only removed occasionally, and applied for a time to the opposite member. Pulse 84°, small and weak; extremities cold; trunk warm; temperature of the body 98°.

25*th*.—Body cool; extremities cold; pulse small, weak, and 88°; *conjee*-water stools. The tourniquet has been applied, but had been at times loosened; it had been removed for two hours before I saw the patient at my morning visit. On its being again applied the pulse became more full and regular, and the warmth of the body increased; which was found to be 99° by the thermometer. The usual calomel medicines were likewise exhibited.

26*th*.—Improving in every respect: continue the tourniquets.

27*th*.—Nearly well; slept well; temperature of the body natural; secretes urine, and dejections much improved in consistence and colour. Pergat.

30*th*.—Weak; in other respects well.

3*rd November*.—Left the hospital quite well.

I do not consider it necessary to relate other cases, as the result continues much the same. I found it difficult to persuade native patients to continue the application of the tourniquets: not so much from any pain they produced, as from their feeling a degree of restraint in the member, to which the tourniquet had been applied; and when there was, at the same time, a feeling of great anxiety and restlessness, as is so often the case in this dreadful disease, they seized any opportunity of removing the ligature, which afforded almost the only

chance of eventually removing the painful state of anxiety and restlessness. They were disappointed that it did not, as they expected, immediately alleviate the more distressing symptoms. When the obstruction was allowed to continue for a short time, the tourniquet was no longer complained of; and I have seen European patients request that the tourniquet might be applied; so great was the relief which they had obtained from previous applications.

These favourable effects of the tourniquet in the cholera may be classed under the following heads:

1*st.*—Stopping immediately the most distressing cramps of the extremities.

2*nd.*—By increasing the circulating fluid in the trunk, it removes morbid congestions, prevents the morbid secretions, increases animal heat, produces new effects, and most powerfully tends to restore the patient to health.

3*rd.*—By sustaining, and in a measure restoring, the vigour of the constitution, so that medicines act more powerfully, and in a more salutary manner, in removing the remains of the morbid action.

4*th.*—When reaction takes place, by loosening one or more of the tourniquets, the local determinations to the head or heart are prevented; the quantity of blood sent to particular parts, is thus diminished. In such cases the patient must be carefully watched, and the tourniquets immediately tightened, when there is any tendency to a relapse, or any symptoms of sinking appear. I have seen the happiest effects produced which have been ultimately blasted by removing the tourniquets too early, and allowing the symptoms of cholera to form anew when its fatal course could not be arrested.

5*th.*—On this account, I have often been under the necessity of continuing the application of the tourniquets for days

together, with the happiest effects, till they could, with safety to the patient, be gradually discontinued. In all cases we must be guided by the nature of the existing symptoms. When reaction takes place speedily, it is to be promoted and kept up for sometime until a determination to any of the internal organs indicates the necessity of loosening one or more of the tourniquets, which are to be again tightened on the re-appearance of any symptoms of collapse.

Use of partially obstructing the circulation in Syncope, in apparent Drowning, and in Exhaustion.

The late Mr. Hyslop* having bled a lady to syncope, became alarmed at its long continuance, but on accidently raising her from the horizontal position by grasping her arms, and thus supporting the weight of her body, she rapidly recovered. Surprised at this, Mr. Hyslop was led to reflect what could be the cause of so sudden a restoration of the heart's action, and he became convinced, that whilst elevating the body, and allowing its weight to be supported by that part of the arms along which the brachial arteries pass, he must have compressed those vessels, the effect of which compression was an impediment to the flow of blood through these arteries, and consequently caused an accumulation of blood in the heart, from which he concluded that the rapid recovery of this patient from syncope was analogous to the artificial process of transfusion; and he proposed to adopt it in cases of syncope or apparent drowning, in order to revive the heat.

In many severe diseases, the patient after recovering from the dangerous symptoms, sinks into a state of collapse and

* See Dr. Wardsop on Diseases of the Heart. Part I., p. 18, Lond. 1839.

dies. This is frequently the case in cholera; such patients are immediately relieved by the use of the tourniquets. Frequent examples of this disease occur in the Insane Asylum of this city, and I have had opportunity of employing the powerful stimulus, of throwing more blood into the internal organs, with the happiest effects. In these unfortunate individuals, the excitement of feelings and agitation of mind conjoined often with want of rest and sleep, are not unfrequently followed by great exhaustion; particularly at the commencement of the cold season. These weak and debilitated patients first lose their appetite, and this is followed by diarrhœa, coldness of the surface, and a rapid prostration of strength. In such cases the circulation is so languid, that the pulse cannot be felt at the wrist. After repeated trials, I found that artificial heat applied to the surface, and different kinds of internal stimuli, were of little use. In some of these patients the weakness was so great, that when placed in bed they were not able to move, so as to place their limbs in a more comfortable position. The eyes become often affected with indolent ulcers, which not unfrequently terminated in sloughing of the cornea. In other cases the eyes are languid, the vision indistinct, and hearing obtuse. The skin remains cold, and is often covered with a cold clammy perspiration. The average of seven of these cases shewed the animal temperature to be 94°. There was generally a looseness, and the dejections were often evacuated involuntarily; but it did not appear to be the cause of the debilitating symptoms. It seemed rather one of the consequences, as it was sometimes not present. In such cases I found the tourniquets afforded the only remedy, and to obtain the full effect one required to be put on each extremity. The result of my experience is very favourable to this agent. The stimulus of the ad-

ditional quantity of blood directed to the internal parts was speedily evident. The animal heat was soon restored, and by keeping them on for sometime, and cautiously removing them as the symptoms indicated, a rapid reaction and restoration to the usual state of health followed. I have seen patients recover by these means in the worst cases of collapse, when the debility was so great as to prevent the action of the usual remedies.

[It would appear that the pamphlet to which Dr. Wise refers in the commencement of his very curious and interesting observations, is a paper by Dr. Kellie, which appeared in Duncan's Medical Commentaries for 1791 and 1797. Dr. Kellie informs us, that in fever if a tourniquet be applied in the cold fit on one thigh and one arm of opposite sides for two minutes, a mild hot stage is induced, and the patient feels quite relieved. When the instruments were allowed to remain on for fifteen minutes, on their removal the cold symptoms did not re-appear. He also thinks, that if the tourniquet be applied before the accession of the paroxysm, the cold stage will be entirely prevented, and that whether the cold stage be shortened or altogether prevented, the following hot stage will be rendered both milder and of shorter duration. This practice seems never to have been generally adopted, and though not condemned, as the bleeding in the cold stage of Mackintosh appears to be, by the profession, is now entirely forgotten, but it is worthy of remark, that Bailly in 1825* strongly recommended the adoption of this practice in malignant intermittent, where a recurrence of the paroxysm is much dreaded, and it seems to deserve further trial.

The remarks of Dr. Wise on elephantiasis are especially worthy of attention, as his obstruction of the circulation is analogous in its operation to methodical compression, the importance of which in the treatments of tumors is becoming daily more and more recognized in modern surgery.]—J. M. P.

* Traité des fievres intermittentes simples et pernicieuses.

Howrah Hospital Report for 1846, *containing reference also to a few cases of supposed Spinal irritation and disease treated without the Hospital. By* W. A. Green, *Esq., Bengal Medical Service.*

It is unnecessary to remark upon the generally accredited prolific causes of sickness amongst the seamen of the port, such as reckless exposure to day and night temperature, to vicissitudes of extreme heat and chilling dampness, in addition to excess in drinking, &c.

The hospital is an upper-roomed house, cheerfully situated in an open and airy position, in the vicinity of the river. The average monthly range of the thermometer, during ten months of 1846, from the 3rd March to 31st December, placed in the centre room below-stairs, out of the way of currents of air and of the sun's rays, has been as follows :—

	Aver. Temp. 8 A. M.	Aver. Temp. 3 P. M.
March,	79.14	85.50
April,	84.10	89.50
May,	85.32	88.61
June,	84.06	85.74
July,	83.40	84.80
August,	83.32	84.64
September,	83.13	84.43
October,	81.40	82.87
November,	73.90	77.60
December,	64.32	69.90
Annual averg. at 8 A.M.	80.2	Ditto at 3 P.M. 83.3
Lowest temp. at 8 A.M.	62.	Highest temp. at 3 P.M. 92.

NUMERICAL TABLE OF ADMISSIONS INTO HOSPITAL DURING 1846.

	Diseases.	Jan. Cured.	Jan. Died.	Feb. Cured.	Feb. Died.	Mar. Cured.	Mar. Died.	April. Cured, relieved.	April. Died.	May. Cured.	May. Died.	June. Cured.	June. Died.	July. Cured.	July. Died.	Aug. Cured.	Aug. Died.	Sept. Cured.	Sept. Died.	Oct. Cured.	Oct. Died.	Nov. Cured, relieved.	Nov. Died.	Dec. Cured.	Dec. Died.	Total. Cured, relieved.	Total. Died.	Ages. Cured, relieved.	Ages. Died.	Ratio of death to recovery.	No. admitted far advanced, on an average on what day of disease.
Cerebral and Spinal diseases.	Apoplexy,	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		20 to 30 1		
	Coup de soleil,	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1 to 20 1			
	Delirium tremens,	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	2	1	1	0	2	0	0	0	7	3	20 to 30 2; [illegible]; 40 to 50 [illegible]	Ditto 2; Ditto 1		
	Mania,	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0	10 to 20 1; 30 to 40 [illegible]			
	Tetanus,	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		20 to 30 1		
	Paralysis,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	10 to 20 1			
Thoracic diseases.	Phthisis,	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		20 to 30 1		
	Pulmonary inflammation,	1	0	2	0	3	0	1	0	1	0	0	1	0	2	0	1	0	0	0	0	2	0	0	0	10	1	20 to 30 10; 30 to 40 3; 40 to 50 1	Ditto 1		
	Morbus cordis,	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	1	10 to 20 1; 20 to 30 1	Ditto 1		
Abdominal Visceral diseases.	Hepatitis,	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	3	2	10 to 20 2; 20 to 30 1	20 to 30 2		
	Spleen disease,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	20 to 30 1			
	Colic,	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	[illegible]	0	1	0	1	0	1	0	10	0	10 to 20 1; 20 to 30 7; 30 to 40 [illegible]; 40 to 50 0			
	Gastralgia,	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	10 to 20 2; 30 to 40 [illegible]; 40 to 50 1			
	Diarrhoea,	2	0	0	0	15	0	3	0	7	0	[illegible]	[illegible]	[illegible]	0	3	0	[illegible]	0	1	0	[illegible]	0	1	0	47	0	10 to 20 1; 20 to 30 [illegible]; 30 to 40 7; 40 to 50 [illegible]			
	Dysentery,	0	2	[illegible]	0	1	0	2	0	0	0	[illegible]	[illegible]	[illegible]	0	[illegible]	[illegible]	1	0	[illegible]	2	[illegible]	4	[illegible]	[illegible]	25	12	10 to 20 [illegible]; 20 to 30 1[illegible]; 30 to 40 [illegible]; 40 to 50 2	Ditto 3; Ditto 5; Ditto 2; Ditto 2	32.4 per cent.	5 on 15th day.
	Worms,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0				
	Hæmorrhoids,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0				
	Dyspepsia,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
	Jaundice,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				

Numerical Table of admissions into Hospital during 1846.—*(Continued.)*

Diseases.	Jan. Cured.	Jan. Died.	Feb. Cured.	Feb. Died.	Mar Cured.	Mar Died.	April. Cured, relieved.	April. Died.	May. Cured.	May. Died.	June Cured.	June Died.	July Cured.	July Died.	Aug Cured	Aug Died.	Sept. Cured.	Sept. Died.	Oct. Cured.	Oct. Died.	Nov. Cured, relieved.	Nov. Died.	Dec. Cured.	Dec. Died.	Total Cured, relieved.	Total Died.	Ages. Cured, relieved.	Ages. Died.	Ratio of death to recovery.	No admitted far advanced, on an average, on what day of disease
Fever, ...	15	1	2	0	5	0	10	0	18	1	14	0	14	0	12	1	29	0	11	0	7	0	6	0	176	3	10 to 20 40. 20 to 30 91 30 to 40 28 40 to 50 16 50 to 60 1	20to30 1 Ditto 1 Ditto 1	1.7 per cent	3 on average of 9th day.
Cholera.	0	0	1	0	3	2	3	7	4	8	0	1	1	3	2	0	0	1	1	1	3	2	0	0	18	25	10 to 20 3 20 to 30 10 30 to 40 2 40 to 50 3	Ditto 2 Ditto 19 Ditto 2 Ditto 2	58 per cent	
Rheumatism, ..	0	0	3	0	5	0	1	0	1	0	1	0	1	0	1	0	1	0	3	0	0	0	2	0	19	0	10 to 20 1 20 to 30 7 30 to 40 7 40 to 50 3			
Scurvy, ...	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	7	0	20 to 30 2 30 to 40 4 40 to 50 1			
Cutaneous disease,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
Syphilis, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	0				
Disease of testicle,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0				
Injury to joints, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0				
Wounds, ...	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0				
Burns, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
External abscess,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0				
Fracture, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
Opthhalmia, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
Otalgia, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
Bone disease, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
Musquito-bites, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0				
Ulcus, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0				
Superficial inflam.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0				
Œdema of feet, ...	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
Fistula in perineo,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0				
Stricture, ...	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0				
																									425	50	Total ages. 10 to 20 97 20 to 30 207 30 to 40 93 40 to 50 37 50 to 60 1 — 435.		1 in 10 of the whole	

The above amount of mortality is rather that of disease in a tropical climate, allowed to run on unchecked, than of disease under regular and ordinary treatment.

Independently of the usual great mortality from cholera, 15 cases in all out of the 50, of dysentery, fever, hepatitis, delirium tremens, pneumonia, were admitted in a stage of advanced progress of the ultimate morbid results of these several diseases, and beyond hope of relief.

Fever.—There have been 179 admissions of fever, all, with two or three exceptions, of the remittent type, and of a very mild character. The greatest number of fever cases have occurred during the hot and rainy months of May, June, July, August and September.

The average length of the fever state, from the commencement out of hospital to its cessation in hospital after treatment, has been during these months eight days, whereas the length of the fever symptoms in the total of the cases throughout the twelve months (calculated with some care) has been upon an average seven days. The relative liability of different ages to fever is seen (upon a very small scale) in the table. The duration of fever symptoms strictly is intended above, not the length of time from the commencement of the disease until discharge from hospital, for several days are always allowed in hospital for recruiting the strength. No one of the three cases in which death took place came fairly under treatment. The mischief had been done in all before admission. In two out of the three death followed in the course of a few hours; in one the accession of a violent paroxysm of fever seemed to carry off the patient. He had been sick on board-ship for three weeks, and had been admitted in the morning without any great heat of surface. It now and then happens, that a single paroxysm of fever is fatal in this country; the disease striking violently, as it were, at the vital powers and annihilating them. The following is a short account of the fatal paroxysm.

"J. G., aged 17, admitted into hospital at 9 A. M., is said to have been suffering from fever three weeks, he was ordered a simple saline febrifuge; 5½ P. M. body and head became very hot, with delirium, followed shortly by stupor and stertor, which lasted until death at 11 P. M.; pupils were dilated; pulse rapid, weak; livid tongue and features from the first appearance of stupor. Post mortem examination after 14 hours:—an excessively loaded and congested state of all the blood vessels of the brain, both superficial and deep seated; effusion of serum to the extent of an ounce altogether at the base and within the lateral ventricles. Portal vessels loaded with blood; a purple congested state throughout the mucous membrane of the stomach and alimentary canal; spleen very soft, easily breaking down under slight pressure."

In the treatment of the fevers of this year, it has not been necessary nor advisable to use the lancet in any one instance. In several of the protracted cases with typhoid symptoms, wine has been found most serviceable.

Dysentery.—The number of cases treated has been 37. The mortality has been very large, viz. 12;—8 of which were admitted with the symptoms of far advanced ulceration of the bowels. There occurred a combination of hepatic abscess with the dysentery in two instances. In several of the fatal cases the disease has passed through the several stages or kinds of the disease usually enumerated, viz. of diarrhœa more or less protracted, of acute inflammatory dysentery, and of the last closing stage, which is very commonly hæmorrhagic, where the dejections consist of a sanious liquid with flakes of membrane, or of a dark reddish coffee-like fluid, or of little else than blood, and that passed in large quantities. In these fearful cases of dysentery, I have found, upon post mortem examination, extensive surfaces of corroding ulceration, smeared with small fragments of red coagula, and extensive surfaces of large sloughs of membrane, the contents of the large bowels being precisely similar to the dejec-

tions. Diarrhœa, of some continuance, is often the first stage of severe dysentery ending favourably. In the case of a lad of 19, admitted in the inflammatory stage of dysentery of several weeks previous duration, with the characteristic symptoms of great abdominal tenderness and tumefaction, with distressing tormina and tenesmus, and the dejection of blood and mucus and shreds of membrane, where death was occasioned by the sudden attack of cholera, the following were the post mortem appearances, of the intestines more particularly, and they were such as, notwithstanding the severity of the symptoms during life, were quite compatible with recovery, had not cholera supervened, namely, colon, its mucous membrane throughout of a somewhat livid colour, the epithelium of the membrane detached in many places and hanging loosely, the mucous membrane highly vascular and of a purple colour in patches, in the midst of these patches were small ulcers, apparently filling up by a process of granulation, their surfaces of a purple colour. I have noticed in several of the examinations of dysentery, a honey-combed ulcerated state of the membrane at the extremity of the ilium, the seat of the small aggregate glands.

In October last a ship arrived in Calcutta from Sydney, having taken in water at Copang, on the island of Timoor, in the Straits, and from that date the crew and officers became unhealthy, almost all of them suffered more or less from dysentery. Upon arrival at Calcutta a number of the men were sent into the Howrah Hospital; several of them had been passing blood for weeks, and the circulating blood in several instances had become scorbutic, evinced by bleeding gums, pallor of gums, and general sallowness of complexion, and, in the after examination, by a softened condition of the spleen: of these cases three died.

In the management of dysentery, I depend upon early bleeding, and the ipecacuanha and mercurial treatment. At

the period at which I have usually resorted to sugar of lead, I have not found it answer the end intended.*

Hepatitis.—Out of five cases of hepatitis admitted, there have been three cases of abscess, of which two have been combined with dysentery of the severest kind, and in one of these complicated cases, in which there existed a further aggravation of pericarditis, the presence of abscess was not suspected, so completely was it masked by the virulent dysentery.

In making a few remarks upon abscess of the liver, I shall give the sum of my experience in reference to other cases as well as to these. In the consideration of hepatitis advanced to the stage of abscess, the most important points are the early detection of abscess, and the prompt application of appropriate means of cure. I have no doubt that many lives have been prolonged since the stimulus given to the early opening of abscess of the liver by Drs. Mouat and Murray. The success of the operation of exploration and of subsequent opening of the abscess depends of course upon its bold and early adoption; otherwise, the chance of success is a very contingent one, depending upon the amount of disease in the liver, the size and number of the abscesses, the particular pathological character of the abscess, the condition of its

* The remark of Dr. Green regarding the inefficacy of sugar of lead has induced us to compare the mortality from dysentery in the hospital under the General bleeding, calomel, and ipecacuanha system, and under the soothing treatment by local bleeding opiates, sugar of lead, astringents, &c. The results are as follows:

Bleeding and Mercurial treatment.		Opiates and Astringents.	
In 5 years.	227 admissions. 48 deaths. 21 ratio of mortality per cent.	In 3 years.	80 admissions. 10 deaths. 12 ratio of mortality per cent.

We are quite aware of the danger of arriving at erroneous conclusions regarding the action of medicines from a limited comparison of facts; still the above return is undoubtedly unfavourable to the system introduced by Twining, which we believe has long been losing ground with the profession in India.—J. M. P.

walls, &c. Out of five cases that I have operated upon for the relief of abscess of the liver in and out of the hospital, in two only has success attended, leading me to infer that in these two cases happily there had existed but one abscess, the early emptying of which had relieved the irritated system and left nature free to repair the lesion of the organ. In a great many other cases that have come under my notice, post mortem examination has almost invariably discovered two or more collections of pus, or else one large bag, the result of the destruction of a large portion of the liver, and often numerous small abscesses have been found in the organ scattered throughout both lobes, of the size of several peas each or of a walnut. The abscesses are found in all positions and directions, tending towards the front, or towards the back, or side, or in the direction of the lungs and other viscera. As often as not, there is no defined bulging, although the side, as a whole, is generally perceptibly enlarged. In notes that I have of more than twenty cases, I have only mention of one case where any thing like a cyst was found, and in that, in one only of two associated abscesses, a semi-cartilaginous lining to the abscess was found with a rough secreting yellow-white surface, contents healthy pus. More commonly upon post mortem examination of abscess of the liver, the walls are found ragged and shaggy, formed out of the substance of the liver, which is breaking down and undergoing conversion into pus, by a combined process of degeneration and death of structure and of ulcerative absorption; again, the immediate walls of the abscess are often white and devoid of blood, and of a basket-work appearance from interstitial absorption; or in other cases the walls of the abscess may be described as composed of the usual substance of the liver, heightened in colour by increased vascularity, at the same time softened and brittle in texture, and interspersed with minute white spots of deposited matter, these having the appearance sometimes of atoms of suet. Skirting abscess, the liver usually displays

increased vascularity, and is brittle and easily lacerable. In cases of abscess it is common to find the liver in other parts of a pale colour, both superficially and deeply seated. The contents of abscess usually are pus with detached flakes and sloughs of the organ, or else a dirty, thin, sanious, fœtid, and gritty liquid.

With regard to the relation as cause and effect, of hepatic abscess and dysentery, I am inclined to regard the two diseases as contemporaneous or successive, although distinct, products of similar causes, not as dependent the one upon the other; for each is so often found to exist alone, and, besides too, experience shows such to be the insidious nature and course of hepatic abscess, that it may exist silently and go on increasing without exciting recognition, and so may have preceded the dysentery, although, after a complication with dysentery, such a masking of both diseases can no longer remain. Dr. Copland seems to take this view, allowing at the same time the possibility of connection of the two diseases: in one case, not complicated with dysentery, I found greenish purulent contents in the hepatic veins, which appeared enlarged and gaping upon incision into the liver. Of the passage of pus through the portal vessels from the bowels there seems to be no doubt. The subject has been well summed up by Dr. Budd in his work upon the relation between hepatitis and dysentery.

I have almost invariably found the liver closely adherent to the diaphragm, and so to the walls of the chest, through the medium of the peritoneum, and I believe the diaphragm may be penetrated with perfect safety in opening abscess of the liver. I am an advocate for an early opening into the liver with a trocar, first dividing the skin with a lancet, upon a well considered opinion of the presence of matter.

Colic.—Several cases of this kind, of acute suffering, have been admitted into hospital. Four cases have been admitted from the same ship lying in dock, in September, within the

course of a few days. The disease has been attributed to excess in drinking bazar spirits. The pain was most severe, felt at the umbilicus and lower abdomen, extending to the back, doubling up the patient, accompanied by tenderness and tumefaction of the abdomen, constant retching and rejection of a green liquid; the pain of long continuance at a time, and recurring in aggravated paroxysms; there was a loaded white tongue; general pallor; great distress of countenance; damp skin. The complaint had existed in these cases for several days before admission, preceded in some by diarrhœa: relief was obtained in these severe cases upon an average on the 4th day, discharge from the hospital took place on the 15th day after admission. They were left in a low tremulous state with a tendency to diarrhœa after the subsidence of the severe pain.

After such cases cholera often follows. Treatment employed gave temporary relief, but the spasms returned, such as frequent leeching, hot bath, sinapisms, turpentine fomentation, turpentine and assafœtida enemata, laudanum and ether, calomel and opium, aperients.

Diseases of the Spinal Cord and Nerves.

Two cases coming under this classification have been treated in the Howrah Hospital this year, another case treated in the hospital in bygone years has been added, and four other cases treated in Howrah and the neighbourhood, and occurring about the same time, have also been added; the whole forming a group of disease, and taken together, not devoid of interest. I consider rheumatism too indefinite an expression for several of these cases, believing the seat of the severe nervous spasm in some of them, and of the nervous paralysis in others, to be in the spinal cord the nervous centre of motion, as well as in the nerves. The precise abnormal condition of the nervous centre, I cannot pretend to define,

whether appertaining to the blood vessels only, or to them and the nervous tissue conjointly.

Tetanus.—The case of a man, age 29, admitted into the hospital in the middle of May, of a very severe description, followed by death on the third day after admission. The only assignable cause seems to be sleeping on deck at night.

The principal symptoms in the case were locked-jaw; great pain and sense of constriction of the throat, and difficulty of swallowing the smallest quantity of liquid, and difficulty of speaking; severe pain is felt at the hypogastrium, as of compressing the bowels, obstructing breathing, and, simultaneously with it, the head and back are curved backwards, attended with frightful spasms, recurring in quick succession; rapid, soft, pulse; perspiring skin; the attempt to swallow calling into play the whole associated morbid train of spasmodic action.

Post mortem examination 12 hours after death. Externally, lividity of the surface of the back and other parts of the body. Head, very great cerebral congestion of the sinuses and blood vessels of the brain, neither effusion of serum, nor softening of the cerebral substance observed. Medulla spinalis, a pulpy softening of the lumbar portion for the extent of an inch, a few blood vessels distinctly injected ramifying over the medulla at the part posteriorly; general vascular fulness of the other organs of the body observed; nothing remarkable observed in the lining membrane of the wind-pipe. The treatment consisted of large doses of tartar emetic at first, of calomel jalap and croton oil, venæ sectio, leeches to the back, of blisters, turpentine enemata, extract belladon, gr. ss. every hour for 8 doses, extract hemp, gr. ij. for several repeated doses, administered per os et anam.

In another case, in a lad of 19 years, in which decided relief was obtained on the evening of the 4th day, the attack commenced with gastro-enteritic derangement, vomiting and watery purging, burning pain in the epigastrium extending along the chest up to the throat, with a sense of dryness of the throat and globus hystericus obstructing breathing, and great pain and difficulty of swallowing liquids, difficulty also of speaking, respiration hurried at times and attended

with groaning, pulse weak, tongue dry, skin moist; he lapses at times into a comatose state, and is not aroused by loud speaking, his features remaining tranquil; he was treated with calomel and opium, sinapisms to the back, leeches applied high up on the chest; locked-jaw speedily supervened, attended by convulsive contraction of the fingers, and throwing back of the head and gasping for breath; severe abdominal pain and constriction of the throat preceding these spasms. During two days he took seven doses of tinct. hemp, the doses gradually increased up to 30 drops, after which he slept; other means were used, such as aperients, turpentine enemata, setting him over steam whilst enveloped in a blanket, blister to nape of neck. He constantly refers to his throat as the seat of pain, pulse rapid, bowels well moved. At times fits come over him, of a few minutes' duration, and of frequent recurrence, in which, with closed eyelids and reposing features, the teeth become closed and the fingers contracted, the pulse during the time being slightly retarded, the pupils active, the attention not to be aroused; he then seems to awake out of the state, sighing, and panting for breath, pointing to his throat as if feeling sore: tinct. hemp was again administered on the 3rd day. On the evening of the 4th day felt comparatively well, and recovered shortly.

In two other cases occurring in Europeans, one aged 30, the other 35 years of age, in both of which anxiety of mind and much exposure to the sun and wet weather seem to have concurred in the production of the disease, the symptoms were as follow: paroxysms of lancinating pain in the back of short duration, recurring at short intervals, making the patient scream out; the slightest movement and the action of vomiting bring on severe cutting pain in the dorsal spine, the pain during the paroxysms extends upwards to the neck and occiput, attended with constriction and uneasiness about the throat and jaw, and with difficulty of breathing, speaking, and swallowing; there is heat of head, quickened pulse, incessant thirst, vomiting, the skin perspiring. In one of the cases the head and back were convulsively retracted during the paroxysms of pain, and cramps in the muscles of the legs were felt. Recovery took place in each of these cases, after a few

days. Treatment, leeching largely to the head and back, sinapisms and blister to the back, setting them over steam whilst well covered up, opiates, aperients.

Paralysis of a rheumatic character occurring in a boy of 14 years of age, after confinement to his cot at sea in consequence of sore legs. He began gradually to lose the use of his limbs, the paralysis having been preceded for a week by severe abdominal griping. Without having previously experienced pain in his head or joints, he has become quite unable to stand, having lost all strength and power of support in the ankle-joints; he cannot now raise either thigh upon the pelvis, or raise the arms at the shoulders; he has nearly lost all voluntary power over the ankle-joints, and over the joints of fingers and toes; he experiences a sense of numbness from the knees and elbows downwards; the muscles of the lower extremities are much emaciated; there is slight tenderness on tapping the dorsal spine; he is conscious of tickling when applied to the sole of the foot, although not of pinching it. Whilst taking strychnine one grain in the course of four days, continued for 16 days, he experienced creeping and tingling sensations in both legs, startings in his sleep, and occasional headache and giddiness. The treatment consisted of a blister to the back low down, strychnine, cold bath, and, especially, of constant use of the joints by causing him to try to support the weight of his body, and by repeated motion and friction of the joints. In less time than a month he walked well alone; too violent exertion during the progress of his restoration occasioned headache, and a feeling of tightness of the hamstrings, and threw him back for a day or two.

In another somewhat similar case of paralysis, in a man of 30, only of greater helplessness, in which the feet were quite, without the influence of the will, and perfectly useless, dangling at the extremities of the legs as if attached to the legs at the ankles by joints of leather—the history given was obscure; the man had been a free liver, had seen vicissitudes of fortune, and been exposed in the course of his life to severity of climate; he dates his present complaint from a cold caught on the river six months ago; that he then began to experience symptoms of paralysis in both lower and upper extremities with loss of memory; he was admitted into hospital perfectly bed-

ridden, unable to raise his lower extremities off the bed, there is increased sensibility to touch of the shrunken lower extremities, particularly about the calves, and a stiff contracted state of the hamstrings; no pain on tapping the spine; he does not sleep at night, and there is considerable morbid nervous anxiety about him. In the course of three months after the same sedulous use as above of motion, and gradually bringing the loosened joints to bear weight, and general tonics given internally, he began to walk with support, and rapidly recovered afterwards.

Another case occurred this year in the neighbourhood of Howrah, partaking of the nature of the two last cases, and referable, I am of opinion, to spinal medullary irritation or morbid alteration of some kind; the patient, an old soldier, of 50 years old, has been subject in other years to severe pains and numbness of his lower extremities; this year, after having ailed at different times from diarrhœa and rheumatism, towards the end of the rains he was attacked with the following symptoms, viz. vomiting after taking his food, general uneasiness of body, giddiness, he complains of exquisite sensitiveness and soreness of the whole surface of his body, so that he cannot bear the least pressure over him, or the slightest breath of air to blow upon him without experiencing great pain; he has a sense of tightness across his chest, and weight at the epigastrium, with some little tormina and tenesmus; numbness and loss of power of extremities and joints generally, and general prostration; no pain felt on tapping the spine. He improved considerably in about a month, and after a trip to the Sandheads. The treatment consisted of aperients, hot bath, sinapisms, soothing doses of antim. potass tart., c. tr. opii., blister to the back, enemata; latterly quinine and port wine to recruit the shattered strength.

Morbus Cordis.—Several interesting cases of disease of the heart, in all seven, have been admitted into the hospital during the year; the disease having been recognised by the symptoms during life, and the diagnosis, in some of the cases, confirmed afterwards by post mortem examination. Of four cases in which an opportunity of examination occurred, complications of other diseases existed: in one dysentery carried off the pa-

tient; in one dysentery and hepatitis; in one delirium tremens; in another case of extensive endocarditis, complicated with dropsy into the large cavities and bronchitis, death is attributable to the sum total of the diseases taken as a whole. In two other cases, not fatal, rheumatism was associated.

The forms of the heart disease met with have been pericarditis and endocarditis, hypertrophy and dilatation; placing in juxtaposition the ordinary physical signs and those by auscultation, with the post mortem appearances—

I find that in case 1st, (death by Dysentery) the heart symptoms were pain and oppression of chest, and difficulty of breathing, coming on in paroxysms; also occasional momentary shooting pain through the heart. By auscultation, a bruit heard over the heart, with increased natural sound heard on the right side of the heart. On examination there were found within all the cavities of the heart clots of black blood, and leathery, colourless, coagula adherent to all the valves; a granular condensation of the mitral valve at its edge and throughout it; left ventricle very much thickened and contracted in calibre; of the right ventricle the walls much attenuated.

Case 2nd.—(death by Delirium Tremens). The man's restless state did not admit of auscultation, he complained of palpitation; any other symptoms were masked by the delirium.

There was found hypertrophy of the left ventricle; the lining membrane of the ascending aorta and of its arch was found much thickened, atheromatous, with spiculæ and plates of bone embedded in it; the calibre of the aorta at the part dilated.

Case 3rd.—Heart disease with bronchitis, followed by dropsy into the pericardium and all the cavities; the chief symptoms referable to the heart were distressing paroxysms of difficult breathing and of palpitation; rapid small pulse. By auscultation, the sound of the heart loud and of great extent; the action of the heart tumultuous, not of increased impetus, attended at first with splashing noise; a rough, somewhat rasping, sound of the heart heard a good deal to the left and under left arm; the sound of the heart beneath the left breast of a ringing metallic character also, in connection with the systole; impulse of the heart increased at times; both sound and impulse

of the heart at last became smothered. On examination there was found hydrops pericardii, dilatation of both ventricles, endocarditis in the shape of leathery thickened mitral and tricuspid valves, inflammation of the aorta at the root of the semilunar valves, with ulceration and perforation of the aorta at the part; inflammation of the lining membrane of the pulmonary artery also.

Case 4th.—Death from dysentery and hepatic abscess. He complains of difficult breathing at times, and of pain across the chest, and of tenderness on pressing under the margin of ribs on left side: heart's impulse not increased; he has felt the same morbid sensations for a short time many years since: the heart disease of old standing. By auscultation a strong bruit is heard attendant upon the systole all over the heart. Upon examination there was found the closest adhesion of the pericardium to the heart, without any apparent alteration of structure, so that the bag of the pericardium at first sight appeared to be wanting; the pericardium was separable from the heart by careful dissection; the heart, with its closely attached pericardium, was attached to the diaphragm, instead of having the bag of the pericardium to move in.

Delirium tremens.—Ten cases of the disease have occurred in the year, some of them slight; there have been three deaths, one of them in a man a few hours after admission in a dying state. The post mortem appearances of two habitual drinkers exhibited considerable vascular fulness and congestion, as well of the scalp as of the feeding veins of the longitudinal sinus on the superior surface of the brain; considerable effusion of serum within the sac of the arachnoid superiorly, and at the base of the brain, and within the ventricles of the brain, and beneath the arachnoid, found also within the spinal canal; milkiness of the arachnoid, and adhesion of the two surfaces along the line of the longitudinal sinus; a highly injected state of the pia mater, and appearance of bloody points upon slicing the brain. In one case an apoplectic cell of the size of a nut, filled with coagula, was found at the inferior part of the anterior lobe of the right hemisphere.

I have found the best treatment to be large and repeated doses of laudanum, employing at the same time free evacuants and external counter-irritants.

Insanity.—Three cases have been admitted; ages under 20, one; between 30 and 40, two; all three of them of many months previous duration. One of the cases amounted to dementia (age 38). He had been in hospital for a few days at the end of April, but, being quite inoffensive, was discharged. He was re-admitted, May 30th, in a state of apoplexy, or near akin to it—(the post morten is interesting,) admitted at noon, died at 4½ P.M. He was at work, cleaning decks in the morning, seemingly well 4 hours before admission. Symptoms on admission, heat of skin; heavy breathing; does not reply to questions; full, bounding, but compressible pulse; pupils inactive, contracted; low muttering; picking at bed clothes; he had been exposed to rain in the night; he was bled, leeched, blistered, &c. Upon examination 20 hours after death, in May, the dura mater at the parietes of the brain was found thickened and hard in texture; serum effused into the bag of the arachnoid and also beneath it; the superficies of the brain appeared ex-sanguine rather; upon examining the base of the brain, the cortical part of the whole base of the brain, and more particularly on each side centrally, was found to be of a green colour, and softened, and appeared much thinned, and separated readily into loose shreds and flocculi upon handling; the whole of the cerebral substance at the base of the brain, as well as the optic thalami and corpora striata, was softened; upon dividing the tentorium cerebelli, previously to removal of the brain, exit was given to a quantity of clear fluid, three ounces, which must have been confined at the base of the brain; the lateral ventricles of the brain were found distended by fluid to the extent of an ounce or two; cerebellum softened also.

Pulmonary Disease.—There have been admitted one case of phthisis pulmonalis, aged 24 years, and eleven other more or less acute cases of bronchitis, pneumonia, and pleuro-pneumonia (omitting catarrh), ages of these cases between 20 and 30, seven; between 30 and 40, four. It has been ne-

cessary to employ the active measures of general bleeding, leeching, cupping, large doses of tartar emetic, and blisters, in several of these cases.

One case, age 37, was admitted after active treatment on board-ship for five days, in the last stage of the disease; with hurried, catching, and most painful breathing, and with severe pain shooting across the left breast and side: in this, high delirium came on the very night of admission, followed by clamminess and sinking, and death the next morning. Signs by auscultation, râle crepitant at the seat of pain on the left side, respiratory murmur indistinct there and tubular, an occasional guggling sound heard beneath left arm. Upon examination 5 hours after death, enormous congestion of the blood vessels of the brain was found, more than a pound of blood escaped during the division of the scalp and sawing through the bones; the arachnoid milky in places; effusion of serum to a small extent; brain of healthy firmness.

Chest.—The pleura, lining the sternum, was adherent to the pleura, covering the pericardium; a thin layer of yellowish, soft, false membrane interposed between the inflamed and deeply reddened pleuræ at the points of adhesion; the lung on the left side in front adherent to the lining of the ribs; the whole lung was covered with an almost continuous covering of this false membrane, which dipped also into the sulci between the lungs; the lung on this side externally of a dark-purple colour, more particularly so at the dependent parts; upon division the substance of the lung of a dark-purple colour pouring forth black blood, its texture, particularly so at the dependent parts, softened, giving way beneath the fingers; drops of healthy pus exuded upon slight pressure out of the cut bronchial ramifications. The pleura costalis was likewise inflamed and smeared with the same kind of false membrane; about half a pint of yellowish serum was found in the bag of the pleura on this side. The same disease was found on the right side but to a less extent; no internal pericarditis found.

Scurvy.—Seven cases have been treated besides several others of scorbutic rheumatism, the cases have not been of a

very severe character, readily yielding to fresh provisions and fruits, and acids generally. Rheumatism is often found occurring in the same ship with scurvy, as a grade and variety of the same disease, which consists essentially in a depraved state of the blood. Something explanatory of the nature of scurvy is observable in the condition of the natives of this country, particularly during the cold season. They commonly exhibit then a number of scorbutic phenomena, such as spleen disease and ague, bleeding gums and bleeding hæmorrhoids. Scurvy is commonly observed to break out during continued bad weather at sea, after much wet weather—there is an analogy therefore between the two cases—allowing for a certain depression of vital power and energy, the effect of the lowered temperature of the air, and considering it as an agent in the production of the disease, I would enumerate, as a material cause of scurvy, diminished cutaneous perspiration, and the consequent retention of serum and dilution of the blood. Dr. O. Rees in his Gulstonian lectures further minutely explains the effect of this dilution and lowering of the specific gravity of the blood, thus: "the globules of the blood, by absorbing the surrounding serum of lowered specific gravity, become less capable afterwards by the laws of endosmose of attracting to themselves the ferruginous and nutritious part of the chyle."

Syphilis.—Forty-four cases have been admitted, out of these, two only of secondary syphilis; all have proved of a mild character.

Cholera.—Forty-three cases have been treated, out of these, there have happened 25 deaths, the ages of all, and of those that died, are shown relatively in the table. The greatest relative proportion of mortality in this disease takes place, according to these very scanty data, at an age between 20 and 30, the period which is the prime of life certainly with the sailor; and is probably to be explained by the consent of

vigorous life and vigorous disease, as is observed in the phlegmasiæ. In choleric seasons, attacks of gastric disorder from excess, of colic, diarrhœa and dysentery, are often observed to precede cholera at varying intervals.

Tænia.—Two cases have been treated, the worm passing away in small joints only, attended by severe griping pain.

Lecture on a new property of Magnetism, Delivered at the Royal Institution. By Professor FARADAY, D.C.L., F.R.S., *&c.*

Slow advance of science—form of a powerful electro-magnet—its power illustrated by experiments—magnetic curves formed in the air—effect upon an iron chain—magnetic bridge of iron—no attraction of lead and some other metals—magnetised paper—new property of magnets—illustrated by bismuth—repulsion of this metal by the poles—magnets attract some bodies, and repel others—phosphorous repelled by the magnetic current—diamagnetism—all bodies attracted or repelled—the latter class most numerous—lists of magnetic and diamagnetic bodies—diamagnetic properties of water—substances, whether liquid, solid, or pulverulent, point axially or equatorially—magnetic and diamagnetic properties of air in different liquids—vegetable substances, if longitudinal, diamagnetic—magnetism of the earth—phenomena of the dipping-needle—source of magnetic attraction near the centre of the earth, not at the poles—relation of diamagnetism to terrestrial magnetism.—Conclusion.

Since the time that Lord Bacon taught us how to examine nature by experiment, such an immense advance has been made in the investigation of natural philosophy, that we are prepared at the present day to expect a progress onward even from week to week, or at all events from month to month, without any great surprise. But when one considers the general system of nature, which changes not; that all its laws were established from the beginning, although we may discover new facts, and perceive new relations of things, and read laws of nature we call *new*, but which are as *old* as creation; it must occur to the mind as science advances more and more rapidly, because of the light thrown upon it by our predecessors in philosophy, and because of the increase in the number of students, still it increases the difficulty to any one body, or one individual, or one nation

now a days, to make any considerable advances. And further, here is this singular point: according to my mode of viewing matters, we are always inclined to feel in reality, although we acknowledge the contrary in principle, that we think we know every thing. There is a feeling in the minds of many, that we are already in a position to give an answer to almost every question. There is an irresistible tendency in the minds of many persons to this conclusion.

Nevertheless, we are slowly making progress, and to-day it is my duty to bring before you a step in advance in science; that is, to describe a new condition of our knowledge of matter, a new condition of the force we have called magnetic, and which you have seen exhibited in various forms, by a current, and by independent pieces of ferruginous substances. I shall endeavour to make you acquainted with this first gleam of knowledge, for it is only the crudest notions we can expect at present, since these facts are quite new to us. I shall try to make you acquainted with this first germ of what I believe will be a great branch of knowledge hereafter. It relates to a new kind of knowledge—to our knowledge of the *power of magnetism over matter*, and of the capability of matter exhibiting a force beyond that of gravity, or chemical affinity, or even electric action such as it is known at the present time.

I must ask you first to look at my large magnet, although you have seen it before, inasmuch as the development of this branch of knowledge must depend on the condition or power of the magnets. I will for a few moments hold your attention to this electro-magnet before me, and of which there is the larger part below the table. [The enormous poles only of a horse-shoe electro-magnet were visible on the table.] It is a bar of iron, and there are wires round it, which wires go to a battery. We have here, then, a very powerful electro-magnet, with this beautiful condition, that we can make or unmake it at pleasure,—that having the extremes or poles together, I can vary the form of the poles, and make them come nearer, or go further, by putting on moveable masses of iron of different shapes. I have here an enormous amount of power, but I can create it and destroy it *in an instant*. Two or three experiments will shew it at once, from which you may form a comparative judgment hereafter, either next year or ten years hence, when this science has made still

further advances. I give you that kind of action which Volta used when he first discovered the battery. I may not bring my tests [large bars of steel weighing many pounds] in close contact with these poles; if I do, perhaps I shall never get them off again, or at least during the lecture. I must put something between them—a piece of board, for example—which I can easily lift off again. Contact is made, and we have now the magnet in full power; you may see the difficulty of moving the heavy mass of iron away from the poles. I might almost pull the whole table down by the attractive force of the iron beneath influencing the magnet through the thickness of this board. You have seen nothing like this power before. It would suspend many tons weight of iron. It is only by seeing facts of this kind that you become aware of the enormous power I am about to use in the applications I shall make to show this particular kind of phenomenon. I take two bars of iron; on making contact they become one bar. The moment contact is broken it is unmade; and the beautiful condition which we have of making and unmaking, of giving or destroying an extraordinary force, is one essential point in the manifestation of this phenomenon. I should like you to see the condition of the magnetic curves as shewn by means of this arrangement, and which we can soon exhibit by sprinkling a few of these nails on the mill-board. You saw where the two poles were placed; you see how inert the nails are at present. We will make them magnets, and then see how the curves run together. It is almost unmanageable, for as soon as a plate covered with nails approaches the magnet, it attracts them so powerfully as to strip it entirely of its contents. You see here an illustration of the tales in the Arabian Nights' Entertainments. Mark the way in which new powers are given, and bodies of enormous weight are held firmly together. Observe this line of nails actually rising into the air, and tending to make curves such as I shewed you on a former occasion. It is a curious and beautiful thing quietly to look at this action. This is merely incidental; I only shew the point to illustrate the power of the magnet. When contact is made, if I lay a few nails quite at the extremity of the mill-board, they fly instantly to the others in the centre. You see how strong the curves are here, compared with the line of force, by the manner in which they

are drawn. The force is still more powerful when I bring the extremities of the poles close together. Here is an iron chain; and that you may have some notion of the manner in which a body is influenced, I will let you see the effect the magnet has on this chain. I have here got something apparently different from what I had before: I have got a body which I can bring into any shape, and which appears to be, while under this magnetic influence, a soft solid substance. I have now formed it into a bridge in the air. The parts cannot separate, because they are connected by links; but they are also kept from separating by the magnetic influence. When contact is broken, it becomes a common chain as it was before. In this manner you get a beautiful indication of the strange condition of the space extending between pole and pole, by all the matter brought into it. At present I am giving you common magnetic effects; by and by I will give you others.

It is worth while to show that, as regards *lead*, there is no action of this kind; it makes no difference whether there is a magnet or not. These leaden balls roll about just as before, there is no place of rest, there is nothing determined by the magnet upon the lead under these circumstances. There is an effect which I want to show you, but I will show it by and by with other substances than lead. Still, as regards common-action, there is none on these bodies. Here are some iron filings, which are very beautiful and very instructive, because they teach us better what goes through the whole space than does a nail or two. When contact is made you see first that the power affects the edges most; I make the extremities pointed that I may get an increase of power on the points. If I put the whole of the filings down they fall into a mere unarranged mass, taking any shape you please; but when contact is made we can draw them out, and it is beautiful to see the manner in which they hang on each other. Observe the broken lines of force which they represent, and the mode in which you can raise an enormous amount of matter against gravity. Having been formed into a mass, you can make them into a bridge or arch in the air. It is remarkable to see such a space influenced, and the power imparted through the current.

Having given you these illustrations of the power of magnetic matter, I must point out that we are able to get a power from mag-

netic force which this magnet will not give us. If I remove all these things away for the present, take away all the iron, and, as far as I can, clear the table, you will be able to see that I can get magnetic phenomena from this magnet, which before I could not. I am about to roll up this *paper* into a cylinder, or hoop, or roll, for the purpose of showing that it is most likely magnetic, for I never yet found a piece of foolscap paper that was not so. I have taken some pains to keep this paper clear from all impurities of a ferruginous kind, and if I make a nice suspension, I shall be able to hang it between the poles of the magnet and to examine its state. I am now drawing your attention to an arrangement that I am able to turn to account in further examination. The one I have here is in the open air, that you may see all things which occur in it; but I shall by and by adopt another plan to show you the particular phenomena. Here is a piece of cocoon silk, and here are some copper wires, all of which are perfectly free from magnetism. They have been tested by this powerful magnet, and unless they were perfectly free they would not serve my present purpose. If I take this paper and hang it up near these poles, using this little piece of cocoon silk for the purpose of suspending it, and then ascertain whether it is a magnet or not, perhaps to your surprise, and to my surprise in the first instance, it will prove to be considerably magnetic, and will point as a piece of iron would do. I expect you will see that when I shall make a magnet of that which is indifferent and will point anywhere, that most likely it will point between the poles. Contact is made, and we shall see whether it takes up an axial position. If it does, and vibrates, it is magnetic. It does so, and tends to rest between the poles of the magnet. If contact is broken it will take what direction the wind gives it. When the contact is renewed it will become again magnetic. You see how quickly it obtains a new action and goes to the poles by becoming magnetic.

Observe this arrangement. I have ten or twelve cocoon threads which are capable of holding that or any other weight. They have no torsion, no twist of themselves, and therefore they will hold the weight without tending to twist or untwist. All I have to be careful of is to avoid the currents of the atmosphere, and then I will give you this motion as a test of every one that takes place. I am now

about to proceed to an arrangement in which I shall be able to show you that which is a new characteristic of this force of matter. In order to get these effects, I have to be exceedingly careful of my arrangement, and I ask you to be satisfied with small results, small as to the amount of action, but not small as to principle. I must arrange the apparatus in such a manner that I can place substances between these two magnetic poles, and must employ such substances as will enable you all to see it. I must so place them as to afford protection from the current of air in the room, so that I may leave no deception or chance of deception on your minds in reference to the phenomena that take place. I must ask you to spare me a few moments while I arrange the apparatus, of the necessity of which you will have evidence as we proceed. This is a glass screen to prevent the effect of a current of wind. If I put a glass plate on this side, and another on that, I may be able, without hiding things from your observation, to get a movement visibly induced. Here are the centres on which I am about to make a lever move. This is a very fine needle point, and here a long lever, and the centre of motion shall be that tube. I mean to place this end free from the action of the air whilst I make the centre of motion between the poles. I want to bring the poles to act on the substance outside. If I allow this short end of the lever to go upon that end, then all will be free to move. I hope this little cylinder of bismuth is sufficient to counterpoise that end, allowing free motion and showing a new action. The very circumstance I have told you, that we are now engaged in examining new phenomena for the first time in public, must be an excuse for the rough arrangement before you, and which is only the temporary one of a first discovery. If I take a screen so as to allow the ends of the lever to be seen, you perceive it is free to move away, and these being moveable poles, I can bring them upon the one side or the other of the bismuth, and so submit it to the power of these poles. You will soon distinguish between the magnetic force and the new power that moves it by every current through that arrangement. You see clearly—for I allow this pole to come on this side the bismuth—that when that end of the needle moves to my left, this piece of bismuth must be repelled by the pole on my left. It is evident, the things being crossed, that if that

moves one way this must repel it. The needle is at the axis; I am not touching it, but the moment I bring up this pole of the magnet I send it round. Merely by the repulsion of that pole, making and unmaking the magnet, by acting upon the bismuth I can repel it from the magnet. This is utterly unlike what you saw with the iron. When I drew off the iron cylinder, it went back with great power, I could not pull it from the pole; but here the power of the magnet is to *repel*, not to attract. I am not acting by the north pole of one magnet upon the north pole of another. I am taking a substance in its natural state, *not magnetic*, and acting on a pole, and we have found a substance which is *repelled* by the magnet, and not attracted. Up to this time you have known of no substance but what was either *attracted* by the magnet or indifferent to it: I have shewn you the indifference of copper, except a current is going through it, but now I show you another property, I show you *repulsion*, and I could, if I had time, show that this property is universal, far more so than anything you have seen before. Although not so great in amount, nevertheless it is a power equal to gravity, it is even greater than gravity in the mass with which we are now concerned.

I will show you one other substance, and very different to the metals, in order that you may see the effect. I will take a piece of phosphorous. Phosphorous is rather a delicate thing to handle, especially in warm weather like this; nevertheless, I should like to give you a proof that substances, other than metals, have this property, because I want to show that all bodies are affected. We shall succeed as soon as I get the larger part of the instrument into the chamber. Though the indicating cylinder is the same, you will soon see the action that takes place, and if I get the action I will not care about the rest. First, I bring up this pole; on making contact, there is the repulsion. By unmaking and remaking it is stopped by the reaction, only it does not touch, and now you see it is repelled again. I might take you to hundreds of bodies and find them all attracted as iron is, or repelled as bismuth and phosphorous are. There is no one body that is not subject to the one or other action of magnetic force. It is an universal law of nature that *every body in a solid or liquid state is attracted or repelled by magnetic force.*

Taking down this apparatus, and giving you another form, there comes out a very odd consequence, which in fact was the first consequence we met with in this investigation, viz.: that bodies when they are submitted to this kind of action take up a position very unexpected, and utterly unlike anything that we looked for or thought of, or hoped for, in magnetic action. You will easily see that I have something like the other apparatus, a very weak suspension of the silk, with a hook below of copper wire, free from magnetic action. I have stuck a piece of paper on the upper part to make the motion sensible, which paper is fixed to the hook, and therefore will move with it. On that hook I can suspend bodies, and submit them to the action of the magnet. I hope by a little shading of these two poles I shall shut out the air so as to give an idea of the influence of the magnet when bodies are submitted to it in another form. You have seen repulsion—here is another more beautiful form. Here is a piece of bismuth, and I am about, by this silk thread, to suspend it in this little cradle, and then bring it into what I have called the magnetic field, into the place of action between the two poles. It is indifferent so long as the arrangement is not magnetic, but the moment the two poles begin to act upon it, the bismuth will point, but point in an odd position. By making and breaking contact, look how it has swung round. By making contact it will not go round this line, but will swing about that line, and in fact that is the line which it will, at last, take up. Just as the piece of paper swings about between the two poles, so this swings about a little across the poles, or at right angles. When you think of the north and south of the earth, and that this substance is subject to the earth's power, it will point *east and west* instead of north and south, or across the lines of magnetic force. I let it swing, but you see that the power of torsion is such that it will go by; but before it can pass the next time, I will catch it by the magnet, and you will see it sent back. Making contact, it is sent back by the magnetic force, and will vibrate only across the line.

I might show you many other cases of this description: phosphorous will do the same thing. Every body is repelled by one pole or the other if put into a long form, even if composed of several little bits put together. I may take grains of sand, put these into

a tube, make them into a long cylinder, and it will stand along the line of force as bismuth did, precisely contrary to what the magnet does, forming a beautiful contrast to it; and then the phenomena show us that this magnetic force not only has that same kind of duality as respects electricity, as respects northness and southness, but it has another duality, it has that kind of power which makes it magnetic as iron, but in a contrary direction. But we now pass from iron and nickel, the first condition, then nought, and then beyond that to another, the reverse of iron. There is a table behind me to show how various substances are placed in relation to magnetic and diamagnetic action.

Magnetics.	
Iron.	Palladium.
Nickel.	Crown glass.
Cobalt.	Platinum.
Manganese.	Osmium.
Neutral.	
Air and vacuum.	
Diamagnetics.	
Arsenic.	Flint glass.
Ether.	Tin.
Alcohol.	Heavy glass.
Gold.	Antimony.
Water.	Phosphorous.
Mercury.	Bismuth.

From iron to osmium these substances are magnetic. Air and vacuum come into a strange neutral condition; and after them come the other bodies as diamagnetics, from arsenic to bismuth, and a thousand more that might be added. I have shewn phosphorous and bismuth, because they are striking; and I will shew water, because, when you see that *water is magnetic*, you will have a better insight into the phenomena of nature than if I left you without that indication. It is not so diamagnetic, to distinguish it from magnetism, as bismuth is, but it is very much affected. Here is a little tube which contains pure water, the glass of which is so nearly balanced in the diamagnetic and magnetic part, as not to be affected.

When I place it thus in the arrangement, you will have the action of the water itself as a magnetic body. The action will be shewn not so beautifully as if I were alone, philosophising in private, but I trust I shall shew it you. Now I will put it in and repeat the experiment, and see what becomes of the water when submitted to magnetic action, whether it is indifferent, or a substance exhibiting this new and beautiful diamagnetic force. I have put it in sufficiently large to be seen, or if not, the paper indicator will make it evident as to whether it points or not, or whether it points equatorially, that is, across the current,—or axially, that is, between the poles. We have not much power in water; therefore I must be careful that I do not touch it. On contact being made I see it is acting, and will not pass the axial point; it will not point as a magnet, but swing back. On again making contact, you will find that it does not pass the axial direction, but vibrates about the line across. It is coming to rest, and will finally take up its position. The two ends of that cylinder of water are being repelled, and sent in opposite directions. You see how beautifully and perfectly the water shews the same action as the bismuth and phosphorous, *pointing east and west*. It is only a want of time that prevents me shewing you fifty other bodies exhibiting the same kind of action.

Now, that you may be taken from these few general observations a little deeper into the mystery of these things, I must point out the condition of air especially, as in my view of things the condition of air, as a natural substance, is the most important part of this kind of action for us to pursue. I will now take a tube of air and place it between the poles of the magnet; it does not point either in this direction or that. The glass tube, if it be at all influenced, will point the one way or the other, according as it is made of plate or crown glass. Crown glass (containing iron) is magnetic, and plate glass is diamagnetic; but I will give an illustration. When a glass tube is taken, filled with air and sealed up, and put between the two poles, I cannot perceive that there is any kind of action. But you must not suppose this shuts out our observation of this action. By no means; we get action, which, strange to say, I am hardly able to impress upon the minds of those who are the best prepared by previous study to comprehend such phenomena, and the general

effects. I am able to shew you air or vacuum either magnetic or diamagnetic at pleasure. When I put substances between the two poles of the magnet, in order to examine their properties, I must not forget their nature. When I am examining bismuth there is air all around it; if it had power it might influence it, but it has not. If, however, I put iron, nickel, cobalt, or water, I find the medium between the two poles, and which is the magnetic field, has a strong action. Here is a jar partly filled with a solution of iron, and partly with water. [The water was floating on a saturated solution of green sulphate of iron.] There is a separation about the middle; it is occasioned only by the difference of gravity; it is one jar of liquid, but the lower part is iron, the upper water. The weakest solution of iron is magnetic; water is diamagnetic; therefore I have two liquids, which, if I put in this place, I can make the medium through which the lines of magnetic force will act. You see that part of the space between these two points is now occupied by water; and if I raise up this jar and put a board under it, the space occupied between the poles will then be a portion of the solution of iron. I am now about to show you, that the tube of air will appear magnetic, or diamagnetic just as it happens to be immersed in the water or in the ferruginous solution. As far as we know, the air that surrounds our globe may have some remarkable relation to it in regard to magnetism. I think this suspender seems nearly fitted to take the tube, and carry it into the solution. First observe, it is a tube of air sealed and sustained in a cradle of copper wire; and beneath the tube, at the middle part, I have placed a smaller tube containing mercury, which serves for a counterpoise or ballast, to make the tube descend into the solution or water, and keep it beneath the surface. Then there is a card above, which, being parallel to the tube itself, will shew you the position of the tube as respects the place of the magnet. This is now suspended; I am about to put it in; it will sink to pretty nearly the level I want; if not, I can raise it by bending the wire. The adjustment will bring it to the centre of motion, and place it so that it is perfectly free to move in the jar. I am taking the risk of the current of air in the room moving the indicator, because I want every thing free, that you may comprehend the beauty of the experiment. The tube of air is now free to move,

and at first stands rather obliquely across. Contact will be made, and we shall see whether it goes to the axial condition or not. See how regularly it is progressing to its position, and it will stand at last between the two poles as the piece of paper did, and it will take no position but that between the poles so long as it is surrounded by water, alcohol, ether, which make it take that magnetic position. I now have the opportunity of raising this jar, without disturbing the apparatus in any other respect. You see the things remain unchanged, except that it is now in the solution of iron, and it stands as I place this piece of wood. On making contact you will soon see that, although it is in that heavy fluid, it is vibrating rapidly, and will stand in this position. The air will take up the diamagnetic position; it will not move from it; that is its true position in a magnetic body; so that you see the air is a magnetic body in water, and a diamagnetic in a solution of iron. Take any one body out of the list, say flint glass; it is a diamagnetic body to those above it, but magnetic to those beneath it. This is settled, you cannot make a distinction; all bodies come to one category; they proceed by degrees; and air, vacuum, and all gases, are in the middle of these.

Having given you these brief observations, I must occupy the time that remains in bringing to your attention what will be the natural consequence of these beautiful actions of matter. Whilst I give you inanimate and inorganic bodies, it does not seem surprising to tell you these things. If I come to show you that *organic matter* of all kinds is liable to this action, it is a different thing. Here is an apple which is diamagnetic. It is magnetic, speaking in a general sense, subject to magnetism, but it is really a diamagnetic body. When I tell you things of this nature are subject to magnetic force, and not only subject to this force, but all magnets, remember all these things we are dealing with are magnetically related to the earth just as much as the needle on which the mariner depends for instruction in his voyage on the surface of the ocean. When you reflect that these are the consequences that follow, you may perceive the strong effects of this power when it can act on these substances so placed as to be liable to the action of the earth. It is in this view I take up a case or two. Although the apple be decayed, I have no doubt, if it contains no iron or ferruginous body, we shall find it diamagnetic. We

can soon test it. If I place a piece of copper wire—and all this copper wire has been examined—and hang this up so that it shall come between the poles of the magnet, and the thread is able to bear it, I have no doubt that it will point. On making contact, it stops the vibration. That slice of apple will vibrate about this line. It will not pass beyond except from some gust of air. As long as it is exposed to the magnet, it will point equatorially, or contrary to the magnetic needle. It swings right and left; it is a diamagnetic body by virtue of the water and other principles it contains. I have tried it over and over again: I have not tried asparagus, but will do so now to point out to you and satisfy myself that these bodies are diamagnetic, because it is an important point to us, or at least will be so hereafter. This piece of asparagus will show for itself what position it takes up in the magnetic field. It is only requisite that we should take a longitudinal substance and then the thing points. Making contact stops the action; it went back when it came to this line; it will not go beyond it, but will take up this equatorial position. I might put a mouse there, a flounder, or anything that is elongated in this direction, and you get the phenomena. You must have *longitudinal* bodies to show this effect; and you see how beautifully this substance is vibrating across the magnetic force.

I must occupy the rest of the time, the few moments that remain, in speaking of the magnetism of the earth, which I fear is not distinctly understood as it regards the nature of the lines of force, and the condition of bodies on its surface.

I have told you before that the earth is a magnet, and you know it by the way in which a needle points upon the surface. But it is not a magnet, like that needle. It is not as if we had a large magnet extending from end to end from the south to the north poles but it is more as if the magnetic force were something dependent on the equator. I will build up an earth to show this. You must not mind the form of apparatus I am about to use. Assuming this bottle were the earth, making the neck the pole, then putting round this earth of our's currents of electricity, you see how differently they come out to what they would do if they were suspended. Here is a globe around which I can throw currents of electricity, which you know are magnetic from the effects you have seen from this battery.

I will throw the magnet out of its direction; we shall get it round this circuit. You will remember what this indicator did with the bar magnet; one end pointed at one pole and the other at the other, and the thing travelled round and stopped parallel in the centre in a curious way. See what it will do here. On making contact it is affected; you see that by the way the needle moves. But observe how it is affected; it is by an equatorial arrangement of magnetic force, not by the polar one. If it were not so, the black end would point to the surface, but you see how it dips or inclines to the surface. If the earth had a magnetic pole, this end of the needle when suspended vertically would point to that part. The needle, however, points down into the mass of the earth soon after leaving the equator, and follows that beautiful and curious relation which belongs to a single wire, when the needle is carried round it. I have put up a rude diagram to illustrate this. Suppose this were a part of the earth, and that were a bar along its polar axis, a magnetic needle at the equator would stand parallel to the horizon. A little further on, where our latitude is, it would lose the horizontal line, and begin to dip until it stood vertically. You will see the difference if I take an arrangement of wire which is supposed to send electricity round the earth in place of an internal magnet. The needle stands parallel to the horizon: it soon dips when we get to our latitude: it dips in this shape: when you get nearer the astronomical pole, the pole of the earth, it dips very much; but the dip is much more rapid if you assume the magnetism of the earth to depend upon these currents running equatorially, than if you suppose it to depend on the polar axis. Instead of the poles being at the extremities, they must in reality lie close together at the *centre* of the earth.

But whether the mangetism of the earth be due to currents running round the earth, or to a magnet fixed in the axis, the effect on these bodies is precisely the same; and all substances placed in a line—and if placed in this room in relation to the rope before me—would be affected in the same way as diamagnetic bodies; that is to say, precisely the reverse of the needle. The slice of apple, instead of pointing axially, points equatorially.

Now, I must briefly conclude by saying that if you consider, from the experiments you have seen, that all the oceans, rivers, and lakes,

on the earth, are diamagnetic, that all things are either indifferent to the magnetism of the globe or influenced by it, that all the rocks and strata not containing iron are diamagnetic, that if a little statue of Carrara marble were placed between the poles of this magnet, it would point east and west; if a man were hung up here he would point east and west, and that we ourselves are affected by the magnetism of the earth, although in a very slight degree: speaking as to measure, we are affected by laws that permeate every part of the earth: we cannot believe it to be possible in nature that these things should take place and result in nothing. Nothing is unproductive in nature, there is no residue of action that is useless. We have often been deceived in our experiments—we do not know how; we often find action taking place, and we do not know the cause; we sometimes see phenomena, and cannot trace them through; but never, when we are able to trace them, do we find the least surplusage or deficiency in the amount of power or effect. All the power that God has infused into matter, He uses for various effects in creation. It is impossible to know, as we feel we do, that the earth's power as a magnet can be permeating all these things, and all living systems, all animals and vegetables, living and dead, and leave them untouched or unaffected. I have not the slightest doubt that we shall hereafter find what kind of action this is, and what part it takes in organic and inorganic matter. I think I see already the mode in which magnetic action travels through bodies. I showed you that it goes through water and flame; I think I see how it goes through them by virtue of this diamagnetic condition. I think there is a chance of finding out that the magnetism of the earth may have some relation to the sun, because we have ascertained in some degree a certain relation of light to magnetism. Although it does not come to much in filling up the whole system of things, yet it affirms a great fact, in opening a new door to phenomena of different kinds. When we see that our atmosphere is such that it can become either diamagnetic or magnetic, when we see that the atmosphere is related to the earth beneath and the sun above, and that all these bodies have their magnetic relations, we cannot but think that this power is designed for some high and important purpose. As regards the amount of power, though small, it is enough for our purposes; and is, no doubt,

greater as regards the globe than the gravitation which this mass can exert on the substances around. If I were to repeat the experiments of Cavendish and Baily, I should see no such power there, as in this magnet, and that slice of apple. I can hardly measure it by a delicate arrangement, but I can measure magnetic force, and that by rough means compared with what Cavendish and Baily used; and you see how it can be raised to a high degree far surpassing gravitation. When we are engaged in the pursuit of science, as I said before, you must suppose that our tendency to know all things makes us hope the more, when we find that a new door is opened to us, and that we touch upon a chamber so large, but hitherto concealed. In such expectations we are never disappointed; we may often take a wrong way, but we never fail to find, in the end, new riches disclosed to us.—*From the London Medical Gazette.*

Extract from the Diary of Major MARSHALL, *when on Leave of Absence in the Himalaya, A. D.* 1827.

March 11*th.* Moostufabad—10 coss. When within sight of the place, found our tent and baggage on the bank of a rivulet, which was so swollen by the rain as to be impassable. Breakfasted on the bank, and by noon the stream was so much gone down as to admit of our baggage passing. Atmosphere clear and affording us a distant view of the mountains. Three ranges—the snowy range raising its huge white caps to the clouds; on the second, there seems to be a partial covering of snow; the third, appears in comparison extremely low. On this some white houses are plainly perceptible, which we suppose to be Nahun.

13*th.* Nahun—8 coss. The road very difficult for our horses. Met two men with each a couple of pieces of sandal-wood, they expected to get four annas each for their loads. Our baggage was brought upon mules and coolies. Our road this morning was very steep, but wide and firm, having just been repaired by the Rajah of Nahun. The prospects were sometimes beautiful. Deep dells full of beautiful trees of every shade of foliage, close under us, with mountain streams dashing along their gloomy bottoms: sometimes we had a fine view of an undulating valley, and at others we beheld the

plains extending as far as the eye could reach. The bamboos were very plentiful, and we observed many fir trees about Nahun. We saw an animal like a pole-cat, about a foot long, with tail of the same length, and somewhat bushy. The head sharp, like a fox's, and nearly black. The tail and upper-part of the body black, the lower part light coloured. When shot at, it jumped from the top of a tree to the ground, and was making off, when caught and killed by the dogs. Saw a species of pheasant; shot one, in shape like the English, white plume on the head, red about the eyes, but without any beauty of plumage. Saw several wild cocks and hens, much like the domestic, but could not shoot one. We have a fine prospect: on the right and left hills and valleys richly clothed with trees, and in front the town of Nahun at our feet, over which the tops of a few hills, and beyond those an immense extent of plains. The Rajah has a large palace of stone, plastered with white chunam, and finely situated. From this the town extends along the brow of the mountain to a rising ground on the right (on which is a Thakoor Dwara or temple) occupying a small plain. The place is of a respectable size, and has a good appearance; the houses being chiefly of stone, faced with white chunam, with flat roofs, very neat outside, and apparently clean within. The bazar is very good and paved. There are two tanks, but the water is neither very deep nor pure: close to one are the tombs of four officers killed in the retreat from Jythuck, a hill fort about four coss to the north, in an attack on which our troops were driven back by the Goorkhas, in A. D. ——. There is also a handsome stone obelisk to their memory, but without a tablet or inscription, though there is a place evidently designed for the former.

15*th*. Thermometer 59° at sunrise. Walked out with our guns to a forest of firs. They seem to be of two kinds: one, the trunk of which is straight and tall, and devoid of branches to some height, when they spread out considerably: the other species is smaller, the foliage richer, commencing from near the bottom, and ending in a conical form; the latter I have seen in Meeruth. Found no game.

17*th*. Muheepoor—9 coss. The road appeared to us difficult, but we were told it was nothing in comparison to what we should see

further on; the coolies seemed rather distressed. A Puharre, or hill man, will carry nearly a maund for a moderate stage with ease, slinging the load on his back and passing his arms through two strings properly arranged. Half of ours were Desees, men of the plains, or rather of the lower hills, and carried their burdens on their heads, these were dreadfully harassed. Our baggage consisted of a hill tent, with one fly and two shouldarees, and about twenty patarrahs among three of us. Breakfasted at a Hindoo temple (four coss), on the top of a hill, in sight of Nahun. Had a distant view of Jythuck, which appears a small fort. The country began to assume a very interesting appearance, the mountain scenery, becoming very grand. The foliage is very thick and beautifully varied: there was not much cultivation, but the patches here and there were exceedingly pretty. We proceeded a considerable distance along a clear stream, which we had to cross about a dozen times. The raspberry and cranberry were very abundant, and we saw a few cherries. We crossed a rivulet called the Jullal, and then ascending about a coss further, reached our halting place, which is the capital of a district under Nahun, called Syne, a little before sunset. This district is accounted very fertile, and certainly had that appearance. The fields are generally terraces on the sides of the hills, supported by stones and small hedges: occasionally we saw a plain of a few acres. On coming to our tents, we bathed in a fine clear stream, which, a little lower, forms a beautiful water-fall.

18*th*. Seyoon—4½ coss. Breakfasted under a large willow near a stream at two coss, after descending some distance on the far side of the Syne range. On approaching the top we heard some chukores cry, not far from us, but could not get a sight of them. The pass on the top was very craggy and romantic, and afforded a grand view of the tops of Choor mountain, partially capped with snow; and the other mountains gradually sloping towards the Girree river. Met a man attached to the Botanical Garden at Saharunpore, and employed, with many others, in different places on the hills in collecting plants. Thermometer at noon under a tree, 71°. Proceeded at about 2 o'clock, and soon had a view of the Girree, with a stream falling into it from the direction of the Choor: a fine view of steep mountains sloping down to the edge of the river, which we reached after a long

and tiresome descent. The stream is from thirty to forty yards broad, and at the ford as deep as a man's legs, flowing very strong, and in many places rushing with impetuosity among the rocks. Crossed to the village of Syoon, which is close to the river, and inhabited entirely by Brahmins. The houses are many, two-storied, with a wooden balcony to the upper one. The temple dedicated to Mahadeo was of three-stories, and the woodwork rudely carved. The people seemed suspicious, and not at all pleased with our visit. From this place there are two roads to Kotegoor, our destination; one by the Choor and Jullal, which was described as very difficult, and the other up the Girree, more easy and direct; we chose the latter. Caught a Mahasair fish, weighing about two seers.

19*th*. Mangur—6 coss. Crossed the river again a very short way up, at a ford up to the knees. Proceeded along a pretty good path on the west bank, at the foot of high and woody hills, sloping on both sides with a steep descent to the water's edge. Saw some ducks in a pool of still water. S—— and I, both fired just as they were rising; and knocked down one, which however contrived to get again on the wing and fly to the opposite bank. Breakfasted half way near the river. Thermometer at noon 71°. Continued to advance up the Girree which we had again to ford. The river began to appear much smaller. We at length quitted its bank, and about a coss after crossing a stream, called Marnyoor, reached our tents. The village consists of 8 or 10 upper-storied houses with balconies. The situation is hot, being surrounded by mountains. The Zumindars complained of being very poor, and they seemed to have some difficulty in procuring supplies for our people and ourselves, in all about twenty. They grow turmeric—walnuts and apricots are also produced: we procured some of the former of last year's crop.

They keep a great many goats and sheep. The latter are large and like the English. They call them Kadlioo, which name they do not give to the sheep of the plains, calling them Bheree (their name in Hindoostanee), nor will they eat the latter. We purchased a lamb which was pretty fat and well-tasted.

21*st*. Kote—4½ coss. Followed the course of the rivulet, in some places bridges were made of a few branches and stones. Therm. at sunrise 49°: noon 79°. The Rajah of Nahun takes his revenue from

this district in kind, and has here a granary, where it is deposited; the grain, but especially the rice, which is very fine, being afterwards taken away for his own consumption. We bought some potatoes grown by a Zumindar of a neighbouring village, who had procured some from Sabathoo. They are scarcely ever grown in these hills, though the soil would produce them.

22*nd*, Nyrah—5½ coss. Ascended for about five coss (the longest and steepest ascent we have yet had), before breakfast, passing through a wood of stunted oaks (Bān); the leaves, small, and sharply indented. We also saw several holly bushes, and there was a great quantity of a large red flower. The fir is becoming common. Had a fine view of the Choor, and also saw the plains distinctly. Therm. at sunrise 54°: at noon 76°. The latter part of the road even: descended to the village of Nyrah, a larger place than any we have yet seen. The houses are about 50 in number, large and well built of stone, with occasionally a row of a very hard wood (Kellyon, larch), running along the whole length; nearly the whole are two-storied. In the lower story are kept the cattle, in the upper the people reside. They have sloping roofs covered with large planks of the cedar fir (Ruho), procured from the Choor and over these coarse slates. They told us that the snow falls here during four months, and that sometimes it was four and a half feet high, and remains on the ground ten or fifteen days. They have none of their sheep here at present, having sent them all at the commencement of the winter to Syoon, on the Girree. Their milch cows they keep always shut up in the lower stories of their houses, never letting them go out on any account; feeding them on grass in summer, and leaves of oak in winter. Our flock, but especially the goats, were affected with a violent vomiting, occasioned by their eating a shrub which grows about here, which was pointed out to us by the Zumindars, who call it "Oowar." They gave them water, which cured some of them. Here, and all on this side of the Girree, the custom of polyandria prevails, and also infanticide. The female children, when numerous, being put to death by giving them opium, as soon as born. They give poverty as the reason for these practises. The women pretty; a family of several brothers have one wife in common, and the children call them all father. The Syana or headman and the Zumin-

dars told us that it was impossible to ascend the Choor at this season; on account of the snow; we were therefore obliged to give up our design, and content ourselves with a good view of this peak which is the highest point of the second range, being more than 12,000 feet above the sea: on the loftiest part, the snow lay in a large sheet, and lower down it appeared thick among the trees for a considerable distance. The whole of Choor is covered with a forest of trees of the largest size. The larch (Kellyon), the fir (Chur), the cedar (Ruho.) We procured here a little honey of a strong but not unpleasant taste. Towards the evening a cloud overspread the Choor, and we were told that it was snowing. The thermometer, which a little before had been 76°, fell suddenly to 58°, and remained so till sunset.

23*rd*. Shmoga—5 coss. Thermometer sunrise 43°. The road alternately ascending and descending. The ground beneath sloped abruptly, and in some parts nearly perpendicular to the depth of from 300 to 500 feet. It was rather trying to the nerves at first, as one false step would, in all probability, have been fatal. Therm. at noon 65°. Ascended to Shmoga, an indifferent village. The people on this side of the rivulet frequently fought with those on the opposite side, and there are very high houses in some of the villages (which they call towers), which served as a kind of citadel to retire to, when attacked. These feuds formerly common, have entirely ceased since the British influence has prevailed in this country. The inhabitants of some villages at the bottom of Choor, beyond Nyrah, were refractory last year, regarding the payment of revenue, and the Rajah was obliged to come and settle the affair in person: it did not get to blows. They have wolves and bears here. The latter attack a man if he come suddenly on them or molest them. One Zumindar mentioned that his father suddenly met one on the road, which severely clawed his head, and left him senseless on the ground. He was however brought home and recovered. Close to the village there is a solitary Kellyon or larch, the first we had an opportunity of approaching. It was a grand tree, though small of its size. It is devoted to the god Shiva, whom they call Sirgoon. The villagers offered to show us some game, and we went out with our guns in the evening. Two chukores rose out of a cornfield, and we each knocked down one to the great surprise and admiration of these hill men. We saw three or four more

birds, but out of shot: they told us on other days they had seen twenty together. The villagers showed a very frank and friendly disposition towards us. One was a remarkably handsome, tall, and well made young man: the people we have as yet seen have nothing of the Tartar countenance: their features are not so regular as those of the Hindoostanees, and in person they are shorter and stouter.

The country here is less fertile than that we have as yet seen; the crops are thinner, and not so much advanced, the ear being far from full. Thermometer at sunset 67°.

I saw some little sheds at short distances from one another over a little stream: within each was some grass spread, and a small hole made behind. To these places the women bring their children whom they lay on the grass, conducting the rill on the top of their heads, the water falls then into the hole, and is conducted to another shed underneath. This operation is performed for the purpose of cooling the children and putting them to sleep in hot weather, which latter result, I understand, it effectually produces. Saw the first red thistle: found and shot three woodcocks in some willows and marshy ground near the bed of a rivulet. Left the dominions of the Rajah of Nahun, and entered those of the Thakoor of Barsun.

28*th*. Synje—7 cos. Thermometer at sunrise 46°. Saw some deer, called Gholes, of a dark red-brown, at a great distance. They appeared darker and larger than the Kakhur. These animals generally frequent the highest and steepest hills on the banks of a river. These when fired at, dashed over the Girree, on the banks of which we again found ourselves. Saw some black partridges. Breakfasted at four coss: passed through the village of Baruk, where is a very ancient temple, dedicated to Suda Shiva. The form was the same as that of the temples in the plains, with the addition of a wooden roof. Crossed a stream a little above its confluence with the Girree, and soon after forded the latter at the foot of the hill on which stands the village of Synje. Thermometer in tent at 4 P.M. 71°; at sunset 67°. This is the residence of the Ranah of Theog. His is a large house, but the rest of the village is miserable. We discovered we were within three coss of Theog, which is on the high road to Koteghur, and that some inhabitants of this part of the country who were with us, and wished us to go by Koteghur, knew nothing of the road.

Determined to get upon the Suruck or made road, as soon as possible.

29th. Muttyana—9 coss. Thermometer at sunrise 50°. The road was very pretty to-day, being skirted with firs, larches, and other trees. At Nagkundah there is a good bungalow; and here a grand and extensive view opened upon us of the great Himalaya range, raising its huge peaks, the abodes of perpetual snow, in fantastic shapes for an immense extent before our eyes. To the grandeur of the scene was added the pleasure of beholding so near us the great object of our journey, which was to visit these stupendous mountains and the countries beyond them. Nagkundah is a very fine situation. In the rear the view is bounded by the snowy top of Choor, and on the right is the mountain of Huttoo, above 10,000 feet high, which is also crowned with snow at this season. We had an invitation from Lieut. Gerard, commanding at that post, to pitch our tents near his house. Found the Rajah of Bussahir encamped near a village on the road, to the house. He was on his way to Simla to meet Lord Amherst, and hearing that the small-pox prevailed there, had been getting himself vaccinated by Dr. Wilson, on a visit at Gerard's: he is about 19 years of age. Kunawur, the country in which we are going to travel, is a grand division of his territory.

4th April. Dutnuggur—9 coss. The weather, which for the last two days had been rainy, cleared up, and we started in the afternoon, descending rapidly nearly the whole way to the banks of the Sutledge, on which Dutnuggur is situated. It was evening before we arrived; but the place was very miserable, and not worth seeing. The change in the state of the corn in our descent was remarkable: the barley which was not in ear at Koteghur, we found successively as we got lower, first in full ear, then partially yellow, and at length on the banks of the river, quite ready for cutting. We observed some apricot trees, with fruit as large as almonds. The Sutledge does not appear more than forty yards across, but it is very deep, and rushes along with great rapidity: making a tremendous roar when occasionally interrupted by large fragments of rock.

5th. Rampoor, 3,389 feet. We walked to the place, where in the rains, when the river is high, a jhoolah is erected for crossing the stream. It is about seventy yards wide here. A buttress is raised

on each bank, with a post, to which a rope is fixed and stretched across; on this runs a machine of rope with a noose, on which the passenger places his feet and clings, being dragged across by men stationed for the purpose. This perilous bridge has been removed for the present, the water being low; and the people cross by another plan equally curious, viz. on the inflated skin of a bullock, upon which the ferryman places his breast, striking with his feet, and using a small paddle with his hands. One man we saw cross, carried the boat on his back when he reached land, which had a curious appearance, the skin of the head, legs, tail, and ears of the animal being all perfect. He appeared to advance with ease against the stream near the bank, and to swim with great strength; being very little carried down, even in the centre, where it ran very strong. Sometimes a passenger or two cross besides the man impelling the hide; occasionally with loads on their backs.

9th. Goura Kothee—5 coss. Proceeded for a coss close along the Sutledge, to a point where it rushes through deep and perpendicular banks of hard rock, about thirty or forty feet across; and the stream being interrupted in the centre by large white rocks, resembling marble, makes a tremendous roar. From this place there commenced a steep ascent, which continued to our breakfast ground, three and a half coss. We soon rose to the region of the fir and the rhododendron, and had a view of snow. Thermometer at noon under a rock 67°. Still ascent then descent, and again an ascent brought us to Goura Kothee: here is the storehouse of the Rajah of Bussahir. There are a few houses and a temple, and a respectable village a little further on the road, called Dhar.

10th. Surahun, 7,248 feet—5½ coss., Thermometer at 7 A.M. 56°. Our road was through a fine forest of larches, firs, and oaks: principally a gentle descent. Many of the oaks were covered with ivy, which seems to be partial to the tree, as the white rose, which grows to an immense size, appears to prefer the Kellyon or larch, sometimes spreading itself entirely over a very tall tree. Descent for a short distance, then a long ascent to the top of another range, when we had a sudden view of Sooran, situated in a hollow in the mountains at our feet. This is the summer residence of the Rajah, and his house has a pretty appearance. It is about 7,200 feet above the sea, a good

sized village, and we saw several other similar ones in the neighbourhood. Soon after reaching the tents, the clouds collected on the hills around, which are greatly higher than ourselves, the tops being thickly covered with snow, and we soon had some light rain, which increased towards evening. Thermometer at 4 P.M. 55°. The weather cleared up in the forenoon, and the villagers, on account of some festival, decked with rhododendron flowers, the tops of several Kellyon trees, of which the branches and bark, except near the head, were cut off. These were placed erect near some of the houses by ropes, also decked with flowers, and a very tall one was planted in front of the temple of Bheema Kalee, in whose honour the festival, I believe, is kept. In the afternoon the clouds again collected, and rising in thick masses from the bed of the Sutledge below us, spread themselves over the mountains on which we were. The snowy mountains opposite were also covered with thick clouds, and we had constant showers of rain as each cloud passed over us.

11th. Tranda—4 coss. Height 7,089 feet. Thermometer at 7 A.M. 51°; at 10 A.M. 58½°. This was a short march. Before reaching Tranda, there is a fine grove of large Kellyons, one which was above twenty-five feet in girth. These trees, when old, appear to lose their fine tapering tops, having usually a row of branches spread out at the very summit, flat like a table: close to the village is a large grove of pear trees. They were in blossom: the villagers said that the fruit did not grow large, and became of a blackish colour when perfectly ripe. They dry it and grind it into a flour, which they eat mixed up with water. They say they are badly off for flour, and supplied us with difficulty. We are now in the district called "Uthara bees," the language is the Milshan, which is also the language of the opposite side of the river, called the "Pundruh bees," and prevails throughout Kunawur.

In one place the earth had given way above the road, above a stream; and had precipitated itself apparently the day before into the torrent, leaving a large cavity. The road was lined with fruit trees, wild peaches, apricots, pears, and a tree they call Syngool, with blossoms like the pear, but the leaves very different: approaching Soongra, there is a curious and large Kellyon tree, near a Chinese-looking temple, which after rising in one high stem a few yards, separates into

two, one of which some yards higher, throws out a branch, which enters the other, forming an arch. There are several other branches, eight or ten, shooting out horizontally a few feet, and then rising up perpendicularly to the height of a moderate tree: near to this is another tree of an enormous size, something like a chesnut, which they call Hoondool.

17*th*. Wangtoo bridge, 5,200 feet. The made road ceases, and we were soon made sensible of its loss: our path on leaving Soongra, passing along the side of a mountain, and being in some places nothing but holes for the feet for several paces, into a nearly perpendicular rock. I found all my nerve and steadiness requisite to enable me to preserve my footing. It was surprising to observe with what ease and unconcern the hill men proceeded along, hopping from one point to another, without employing their hands to assist them.

The people here brought us the skins of three curious animals, with a skin or membrane, covered with hair like the body, extending along the leg to the foot, and uniting the hind and four legs. Two of them were about eighteen inches in length, with a bushy tail, nearly a foot long. The head sharp, and the hair a soft fur; greyish-brown on the back, and light under the belly. The feet black and small, and furnished with claws.

The third was of the same description, but of a grey colour, and not half the size, with a thin tail. The villagers told us that these animals fly, or rather float, through the air from tree to tree, with the help of the membrane by their sides, to the distance of nearly a hundred yards. They call them Ain, and say they live on the leaves and fruit of the trees, appearing only at night. One of the villagers had a young Moonal, it was of a dark brown-grey. We procured here some of the best walnuts I ever tasted. Thermometer at 9 A.M. 56°. A considerable descent brought us to our tents which we found pitched in a grassy spot, surrounded by huge crags, close to the bridge. This bridge, which is of wood, and called by the natives a Sangool, crosses the Sutledge, at a point where it runs through a bed of rocks, being about thirty yards across. There is a buttress or pier-head on each bank, from which project three rows of large trees, each a few feet farther than the other, and sloping upwards to the distance of about thirteen feet. On the ends of these, which are

about twenty feet apart, are laid two stout Kellyons, three feet apart, and the whole is covered with good boards, all being well fastened down with stout iron nails. The span I should think about forty yards, and the height from the water nearly as many feet; and though of such strong materials, the wind, which is always high, causes the centre to spring up and down. There is a railing on each side, but in bad repair. Formerly there was a jhoolah here, and the bridge was built at the recommendation of our Government, which defrayed half the expences. Thermometer at 3 P.M. 67°. In the evening we caught some fish in the Sutledge, the largest weighing about a seer, of a light colour, with small scales; the flesh is darkish, and very poor-eating. Thermometer at 9 P.M. 56°.

18*th*. Chigown—6 coss. 7,225 feet. Crossed the bridge to the right, or north bank of the Sutledge. The road was at first an almost perpendicular ascent to the top of a craggy mountain, and then a gradual descent along the opposite side down again to the Sutledge, near which we breakfasted. Thermometer at 7 A.M. 56°: at 11 A.M. 71°: continued along the bank of the Sutledge. The road very bad, for the most part on slippery rocks, and the latter part a fatiguing ascent. The heat was dreadful: the rays of the sun being reflected by the rocks. Thermometer at noon 76°. This village which is called by the Kunnowrees, Tholung, is large; but the houses are scattered over the face of the mountain. The ground appears fertile; the crops of barley being very thick, but there is little or no wheat. The walnut trees are particularly fine, and with the numerous apricot trees in the place make it look like a large orchard. We took up our quarters as usual near one of the temples. Mahadeo is the deity worshipped here, and the principal temple is a wooden building in the Chinese style. In this village the Rajah, then a child, with his mother and the hereditary Wuzeers, resided when the country on the other bank of the river was conquered by the Goorkhas. The invaders were unable to cross the river, the bridge at Wangtoo having been destroyed. Therm. at 4 P.M. 67°: at 6 P.M. 65°: at 9 P.M. 63°. Many of the houses here have flat roofs, formed of wood-work, covered with bark of the birch and earth over all.

19*th*. Chigown. Our baggage was on the point of starting, when we were informed, that the road we had determined to proceed was

blocked up by the snow, which fell on the 15th and 16th, having been before open. There is another route crossing to the left bank of the Sutledge here, and after proceeding two days along it, recrossing to the right bank, but we had seen enough of the rocky edge of the river, and we thought it advisable to halt a day at least to enquire into the matter. Thermometer at 6 A.M. 60° : at 11 A.M. 63° : at noon 65°. We are surrounded by snowy mountains, and the Shatool and Brooung passes are no great distance from us, the former SW., the latter South. This place we find warm or rather close, being on the face of the hill, and the wind completely excluded by the mountains overlooking it. The cultivation around is very strong and healthy, and they have a custom, where the ground is particularly productive, of building a pillar in the middle of it, plastered white with some loose stones on the top, with the idea, I was told, that the ill effects of the praises of passengers whose attention may be attracted by the goodness of the crop, will fall upon the pillar, and be averted from the grain : the people here, believing with those of the plains, that admiring an object entails mischief upon it, or that certain persons have an evil eye. There is a great quantity of wild garlic had here. I went to the temple of Mahadeo, in which is a curious image of that deity. The upper part is a cylinder, I believe, of wood, underneath, divided into fourteen or fifteen compartments, in each of which is a head of gilt brass, in relief, about the size of a man's hand, raised on a silver ground. They are all similar, and have a kind of mitre. The ears are of silver, with ear-rings of the same, and both very large. The execution is better than any thing of the kind I have yet seen. There are only three faces visible. The lower part which is of wood and thicker is covered with stuffed silk, and on the top of the whole is a large bunch of the hair of the cow, called Chuor Gao, of a brown colour. This is called the Rajah's deity, and is occasionally carried to Rampoor or Sooran, to visit his Excellency. There is another image of the same kind, but inferior, in the same temple, which is called the village deity. They have some cattle here, the offspring of a cow of the country, and a bull of the species called Chuor Gao (Bos grunialis) from Chowrees or fans for driving away flies, being made from their tails, the hairs of which are remarkably long. This half-breed is called Zō, they are fine large ani-

mals and have the peculiarity about their tails in some degree, and very long sharp horns like Irish cattle. Thermometer at 4 P.M. 67°, at 9 A.M. 63°. Resolved to halt here till the road is open as far as Pungee, three stages hence, and then to proceed thither as it is a large village, where we could procure supplies for a few days, should it be necessary to remain: and its situation is lofty. Thermometer at 6 A.M. 60°, at 11 A.M. 65°, at noon 67°. There are a great many Chukores about here, and a few pheasants.

21*st*. The females here appear much afraid of Europeans—most of those I saw appeared very ugly. Woollen is the only wear above Koteghur. The men wear trowsers, a kind of coat or shirt, a cloth folded round the waist, shoes, the tops of which are of worsted knitted, and a low circular cap generally black or brown with a fold round the bottom, something like a turban. The ladies wear a piece of cloth, covering the upper part of the body and fastened in front with a large brass pin or rather broach, which is a conspicuous ornament hanging in front, and being composed of two bits of brass, as large as the hands joined together, and having a pin fastened to them, in the manner of our broaches. Their hair is plaited behind, and fastened across the back of the head in a large roll, ornamented with two great bunches of red wool, which look at a distance like Rhododendron flowers, and their cap is the same as that of the men with the exception of the cloth on the top being red. This head-dress, when well adjusted, appeared to me becoming. Thermometer at 10 A.M. 65°, at 11 A.M. 65°, at noon 67°.

22*nd*. Meroo or Mirtung—5 coss, height 8,550 feet. Soon after leaving Chigaon, I heard a loud and continued crash, and on looking round I saw a number of large stones rushing down the slope of the mountain I had just passed: H—— who was behind had to run to escape this avelanche. They frequently occur after rain.

There are a few stunted oaks before coming to Oorunnee, the first forest trees we have met since leaving Wangtoo bridge, though the opposite bank of the river is covered with large trees. The country becoming not quite so bare as before. I saw one of that species of fir which bears the Nyoza nut, and which is plentiful above this. It differs from the common fir in having its stem and branches crooked, and its bark smooth and of a light mottled colour. Meroo is a

wretched village, yet it had two or three temples, as appears to be the case in almost every one, and we were lodged in one of them, which was smaller than usual, but much better than a tent. Therm. at 3 P.M. 60°, at 5 P.M. 59°, at 7 P.M. 57°, at 9 P.M. 57°.

23*rd*. Rogee district, Shooal—7 coss, height 9,096 feet. Therm. at 6 A.M. 53°. The country very craggy yet not without wood. Our elevation is becoming gradually higher; and we breakfasted near a precipitous torrent, on the banks of which were large masses of snow, and just below us there was a natural bridge of that substance, formed probably by an avalanche. After breakfast we had a long ascent up a steep mountain, and then to pass along its face, passing over some large sheets of snow, the depth of a man's waist, but hard enough to allow us to walk without sinking. This snow was melting, and the water running down loosened the stones and rubbish which kept up a constant clatter, but the hill not being very steep just here, it did not produce any effect. After gaining the top of this mountain, we had to go down the other side of it in a diagonal direction to Rogee, meeting with another large sheet of snow. On the opposite side of the river I observed the track of an avelanche. The snow appeared to have given way about the middle of the mountain, and to have swept every thing before it for a considerable breadth, till it reached the Sutledge, on the edge of which it lay covered with earth, trees, &c. Rogee is a poor village, and they have but one temple, so that we could not be accommodated; and for want of room elsewhere, we were obliged to pitch our tent on the top of an empty house in which our baggage was deposited. It appears, that the second temple we observed in each village, is only visited by the deity on great festivals, when he is carried thither in a kind of palankeen. Here is also frequently a little open wooden house in front of the temple, in which the idol is sometimes placed. There was a family close to us, in which there were two very good-looking girls. The eldest was a tall and really elegant figure. They appeared clean and respectably dressed (a rare thing among the females we have lately seen), and modest without being so ridiculously bashful, as we have usually found them. Grain is becoming very dear. They would not give us more than 16 seers of wheat-flour for a Rupee, and 20 seers of barley. They make no difference between the price of grain and

the flour, giving as much of one as the other. Therm. at 7 P.M. 59°, at 9 P.M. 57°.

24*th*. Cheenee—3 coss, height 9,000 feet. Thermometer at 6 A.M. 49°. The Begars (porters) not being all ready we took breakfast before we started, the march being short. The road was good, the temperature pleasant, and the scenery fine. The pure snow which covered a lofty range in front of us, glistened beautifully in the clear sunshine. A small torrent we crossed had a high wall of snow on each side, some yards from its bank, which it had probably brought down from above, and here thrown up on its banks. The ground near Cheenee is rather more level, and there is one field close to it of about two acres, the largest piece of level ground we have seen since leaving Koteghur. The situation is very good, and the scenery grand; but the village itself wretched, and all the houses going to ruins; we first got into the shed in front of the temple, which we fitted up with kunauts, but not fitting very well, they did not exclude the weather, which was becoming stormy. The Mookhya shewed us a house which had been occupied by a Mr. Walker, and was one of the best, but it was so dark and filthy, we preferred pitching our tent. The evening was very chill and cloudy, and we had a shower of rain after going to bed. Thermometer at 3 P.M. 63°, at 9 P.M. 53°.

25*th*. Pungee—4 coss. Thermometer at 7 A.M. 49°, at 9 A.M. 55°. The rain having wetted the tent we took breakfast before starting. Just after quitting Cheenee, we came to a fine grove of Nyoza firs, from which we had a most interesting prospect. The ground in front of the village, for the extent of two or three miles, is pretty level, but divided by the terraces into fields of sometimes a very respectable size, which division gives it a diversity, and supplies in the prospect the place of enclosures. The land is well cultivated, and prettily studded with apricot trees in blossom, but not in foliage, and some firs, with a few flat-roofed and neat looking cottages scattered over it. This peaceful scenery is bounded, and finely contrasted by the stupendous mountains, which rise like an amphitheatre in front, and appear at no great distance; their rugged sides blackened with large forests of every species of fir, up to what is apparently the boundary of vegetation, and their peaked tops covered with the purest snow, which extends in huge fields, on which the beholder gazes in admira-

tion till his eyes are tired: nearly the whole road was through a forest, and on approaching Pungee we descended to a torrent, crossed by a bridge. A pretty steep ascent brought us to the village, and we found S—— in his tent near the temple, which, however, proved to be very good quarters, being raised, and having a very comfortable room, fourteen feet by ten, and a balcony in front nearly the same size. A man we sent to Rampore from Chigaon on the 19th, with a letter to Gerard, overtook me with the answer on the road to-day, having been six days in performing a journey of above 150 miles.

26*th*. Pungee—halted; H—— not well. This place is situated on a declivity, and consists of two villages, one above and the other below, about half a mile asunder. The lower one is largest, and is of itself considerable: in the upper one was our lodging; they are both filthy. The neighbouring fields are thickly studded with poplars and peach trees, and there are some vineyards, which are said to produce very good fruit. The mountains which above the higher village becomes more steep, is covered with a forest of larches and Nyozas to a considerable height, when it concludes in a lofty perpendicular narrow rock which forms a singular screen to the rear of the village. In front (south) are the Raldang mountains, one of the highest peaks of which appears on this to be a perpendicular rock, and, no snow of course lying on this side, you can perceive the thickness of that on the top, which is a level. On the left (east) are mountains apparently still more lofty; and on the right is a range now covered with snow, but which melts in the hot months. In the month of June, the villagers all proceed to the top of the stupendous crags in rear of the place, where they celebrate a festival which occurs then, and pile up stones, for what purpose I cannot say, on the edge of the precipice, which are visible from the village. There is a Lama here, but we had not the pleasure of seeing him; and there is, in some places, a kind of large rude urn of stone, plastered and painted, something like tomb-stones, under sheds, put up by the Lama priests, and devoted to some deity with the intention, I believe, of making him propitious to the crops. At Cheenee there are three of these under one shed. We had some slight rain in the evening. After dinner we heard a loud and continued crash of stones falling down the mountain, at a place about three or four

miles on the road on which we were to proceed. Thermometer at 4 P.M. 57°, at 7 P.M. 54°, at 9 P.M. 54°.

27th. Puggee. Thermometer at 6 A.M. 52°. On account of the rain we had determined on not marching till after breakfast; but we were told that the part of the road where we heard the stones falling last night was dangerous after rain, and that it was safe to pass it early in the morning, before the sun had strength to melt the snow, which loosens the soil, and occasions the stones to give way. We determined to halt another day. This we did on account of the porters, who, the day being already advanced, could not have passed the spot before noon. S—— and I walked down to the lower village, which we found a perfect pigstye, and we went to a small vineyard. The plants are supported by a kind of trellice, but were not yet even in leaf. We saw a decrepid old man nearly blind, with a straggling white beard, who told us he was 120 years old, which was a *thumper*, and while we were speaking to him, his wife, a strapping old dame, came out and politely asked us to smoke some tobacco. On our saying we did not smoke, she took a wooden vessel, like a quart measure in England, and brought it to us full of raisins as a present; they were dirty looking things, and we gave them to an attendant, putting a couple of Powlies into her mutchkin in return for her kindness, with which she seemed highly satisfied. She abused the Hills, which all do, calling them a Kāphir (Kafir) country, producing nothing. She spoke a little Hindoostanee, learnt at Rampoor, denoting by horrible gestures and grimaces what she could not otherwise express.

28th. Rarung—5 coss, height 9,022 feet. There are two or three roads from this to Soongnum; the shortest is over the Rooring pass (14,000 feet high), but that is, at this season, impassable. We took a lower road which is good, but round about. Being anxious to pass the spot where the stones fall, before the heat of the day, we resolved to breakfast at Rarung, and not half-way as usual, as the latter plan would cause a delay. About half-way it began to rain, and the shower continued sometimes heavy, for above an hour. This was peculiarly annoying, as it was just the thing to cause the stones to fall, which we had been so anxious to avoid. We however passed the dangerous spot, which was about 200 yards broad, all safely. Huge

fragments of rock were lying in every direction, which seemed to have fallen from a crag at a tremendous height above, down a slope of pounded rubble, along which, though not very steep, they must have rushed with tremendous force, as appeared by the thick branches of a tree which had been recently broken, and the effects of their collision with other rocks lying near the road. The situation of Rarung is pretty; and the stupendous Raldong appears almost to overhang it.

29*th*. Jungee—5 coss. We had breakfast at the village of Ukpa, about two coss, near a heap of stones of an oblong form, four or five yards long, four feet high, and three broad; the top stones of which were carved with characters somewhat resembling Sanscrit, inscribed by the Lamas: there was also a flat stone at each end, much carved. The words are, I believe, the name of the deity. We met two more of these before reaching Jungee, and there are several round the village; they are to propitiate the deity, and travellers walk along them up or down, according to the direction they are going, to insure a safe journey. We met on the road two flocks of sheep carrying burdens, one going down to Rampoor with wool, and the other coming from thence with flour, each sheep carries four batties, or 8 seers. Some will carry as much as 10 or 12 seers. Nearly opposite to this place is a very large and beautiful village, called Ginnum; we heard there were several Lamas here; hitherto we have only seen in the temples men called Poojerees, of the Kunnayut caste, who perform the ceremonies. This afternoon was rainy and uncomfortable.

30*th*. Jungee. The morning was cloudy: we descended close to the Sutlédge, and on its bank above passed over an immense mass of snow, which must have fallen from above, though not at any distance. Here it began to rain, and my attendant informed me that there was some danger of stones falling, a piece of information which, had it been given the night before, might have prevented the dreadful accident which occurred afterwards. A little further on, a stream called the Chungtee, falls into the Sutledge. Over the former we crossed by a plank, and found our breakfast things on its edge. We were obliged to pitch a paul (small tent), on account of the rain which still continued to fall slightly, and we were too much occupied in sheltering ourselves and satisfying our hunger, to observe our dangerous situation under two

high crags of loose rock, one on each side the stream. Up one of these the road led, and after breakfast, most of the other people having gone on, the Khidmutgars began ascending, and we moved out to allow the tent to be packed up, when a crash above announced a fragment had given way. Every one immediately fled for safety. S—— and H—— took shelter under the face of the rock, and I being farther out, and seeing the stones coming towards me, ran off to the edge of the stream; we three escaped untouched, being more lucky than an unfortunate Mussalchee of H——'s, whom I saw struck by two stones on the head. The first seemed only to stagger him, the second, a large flat one, struck him with great force, and hurled him down the rock, about twenty feet. On being taken up, he was found to have a slight cut on the forehead, and a dreadful fracture behind. His legs were a little cut, which I believe was the only effects of the fall. He was alive, but speechless, and apparently senseless: we resolved to return with him to Jungee, as the road to Kanum was long and difficult. We accordingly put him into S——'s dooly, binding up his head as well as possible, and hastened back. On arriving at the village, three Lamas came to look at the man, one of them was a venerable looking person, with long dark hair and beard, and dressed in red. They consulted their books, which were printed with wooden blocks, and they seemed inclined to do the man good if they knew. All they could make of it, however, was that the man was destined to die: no great discovery, considering that a large piece of his scull was depressed upon the brain. He was placed in an empty house, and my brother's Bheestie and another man attended upon him. We sent to Kanum for our bed-clothes and some wearing apparel, which arrived before bed-time; and one of the servants cooked us some *chapathies* and *dal*, which, with a little brandy and water, and a few raisins, constituted our dinner. We heard that my Khidmutgar was wounded in the leg and foot, but only slightly. My brother's dog was also just touched, and these were the only casualties: a wonderful thing, considering the number of persons who were underneath the mountain, and ascending the road, which after going forwards a few yards to the left, makes a sudden turn back to the right, and sweeps round the brow of the mountain. There were besides forty or fifty people with loads on their backs, who passed the same way during the day,

besides loaded sheep, yet we did not hear of one being struck, nor of any more stones falling. The poor Mussalchee lingered till night, occasionally groaning, but generally perfectly quiet, and expired shortly after we went to bed. The weather was changeable throughout the day, and we had a little snow. This must be the rainy season in this country. We saw a real Yak, a male of about five years: a very pretty animal, with long hair, especially on the legs and belly; of a grey colour, and a fine bushy tail, he was not quite full grown: larger than a cow of this country, not so big as an English one; fine tapering horns, gentle; led by a string through the nose, stepped out like a horse.

(To be continued.)

Palæornis Nigrirostris.

To the Editor of the Journal of Natural History, Calcutta.

Sir,—It having been asserted by high authority, that the Palæornis nigrirostris of the Catalogue of Nipalese birds (by the way, why was its publication discontinued after about a tithe only had been given?) is the young merely of Pondicerianus vel Mystaceus, I beg leave to state, that one of my servants now possesses a fine living male specimen of either species, and that he purchased these birds respectively three and a half and one and a half years back, when they were fully grown. It is clear therefore, that there can be no mistake about their present maturity. For the last twelve months I have had them under my own eye, and as they are now in high feather and condition, I will give you a summary description of the differences they exhibit in size, proportions and colours.

Mystaceus is decidedly the larger bird, and has proportionally longer and more pointed wings and tail. The upper mandible of his bill is coralline-red, whereas both mandibles are black in Nigrirostris. The pale cap, common to both, is of a purer hue in the latter species. This cap is also smaller in Nigrirostris, extending to a less distance towards the nape, and at the nape it is more nearly divided from the green mantle by the two horn-like lines of colour, which in both species curve more or less upwards from the ruddy front or neck

and breast. Lastly, the ruddy parts just named are deeper and more fixed in colour in Nigrirostris, not variable and shading towards iridescent blue or plum-bloom, as in Mystaceus.

All the above distinctions are very noticeable, particularly so the superior length of the wings and tail in Mystaceus, and his bright coralline upper mandible, though the latter mark belongs only to maturity, and hence room has been afforded to allege a want of care in the original discrimination of the two species. Mr. Hodgson, however, I suspect was sufficiently familiar with the youthful as well as mature aspect of both birds, and with the changes they undergo in advancing to maturity; and at all events, the above stated facts seem to leave no room for further doubt that Nigrirostris is really a distinct species. My servant's birds were procured in the vicinity of the Rajmahal hills, so that these two species would seem to be found in most parts of the continent of India, having mountains in their vicinity; for all the Paroquets love the shelter of hills, and breed there exclusively, though they wander a good deal in the cold season, especially in the plains.

I am, &c.,

AMICUS.

Critique on Dr. JAMESON's Zoology of Chinese Tartary.

In the 27th Number of the "Calcutta Journal of Natural History" was inserted a letter from the pen of Dr. W. Jameson, containing observations on the Zoology of Chinese Tartary, and as that letter contains errors, which if not corrected, might probably, from the writer's position, be received in Europe as facts, we have deemed it necessary to send you a short critique thereon, to which we shall feel obliged by your giving an early insertion.

Dr. Jameson starts for Chinese Tartary, via the Neetee Pass, and finds "limestone filled with organic remains,"—as many other tra-

* Mr. Jameson's observations were only entitled "*Extract of a letter, &c.*" in such communications, style and strict accuracy, are less to be expected than in papers of more pretension. In this point of view, perhaps the critique may be somewhat misplaced, although otherwise perfectly fair, and, in itself, very valuable.—ED.

vellers have done before; we are not told to what formation the limestone belongs, but the author flatters himself that the elevation of its locality, viz. 16,800 feet, is probably the highest at which fossils occur; no reason is given for such a belief, and that probably because none *can* be given; it may very possibly be the greatest elevation at which *he* has ever met with them, but did not Gerard discover fossils at nearly 18,000 feet? We have an idea that he did. The absence of trees and the more rounded appearance of the hills on the northern side of the Himalayas strike our author, as appears to have been the case with every previous traveller, but nothing new is elicited from his observations. We are told, however, that "deep ravines occur, which drain off all the melted snow water." This fact is only novel in so far as regards its appearance among the observations of a scientific writer, but may we be allowed to ask, if "melted snow water ever takes any other channel of escape in other countries? We have always been led in our ignorance to suppose that such ravines were the natural and only outlets for the waters! We should also wish to know, in what respect "melted snow water" differs from "*melted snow*," for if, as we imagine, they are but one and the same thing, we would suggest the propriety of using the latter term for the future, it having the decided advantage of being *English*, which the former as decidedly *has not!*

"The Burhal," called by our author "*Ovis nahor*," in contradiction we presume of Mr. Blyth, who long since called it "Ovis burrhel," (the "*O. nahoor*" being according to him a distinct species, in which opinion albeit we are more than half inclined to coincide) is said to occur on "both sides, being met with in flocks of twenty and thirty from Mulari on the British or *northern* (!) side of the Himalayas, (we have always been under the impression, that we were living on the *southern side* of the Himalayas!) up to the pass, and on the Thibet side it is equally common."

There is another species of wild sheep met with in Tartary which we are informed, is nearly allied to the "*Ovis ammon of Siberia*;" no wonder, seeing that the animals are identical!

The fact of this identity was many years ago suspected by Mr. Hodgson, when resident in Nepaul, and has since we believe been verified by Mr. Blyth, of the Asiatic Society in Calcutta, and yet our

author, neglecting to make himself acquainted with the labours of Indian naturalists, cannot arrive at any satisfactory conclusion until he has compared the specimen with one in the Edinburgh museum! Here again his meaning is somewhat obscured by the negligence of his style; for he says, the Thibetan animal is allied to "*Ovis montana*" of North America, and to "*Ovis ammon*" of Siberia, and "in fact, from what he remembers (!) of specimens sent to the Edinburgh museum from Hudson's Bay,* he considers the Indian species identical." Identical with what? with "*O. montana*," or with "*O. ammon?*" not with both of them surely, for they are distinct! unless, indeed, on the mathematical principle, "that things which are equal to the same, must be equal to one another," he proposes to double them up all three into one!

Regarding the hare of Thibet, Dr. Jameson observes, that "it is larger than the Alpine hare of England, and is *therefore* probably the largest species known." Had he confined his remark to the simple fact of the superior size of the Thibetan hare, he would have been correct, but why it should "*therefore*" be the largest species known, we are at a loss to conjecture, since so far from the Alpine hare of Britain (not England) being the largest, it is actually, according to the Naturalists' Library, the smallest of the three species inhabiting Great Britain and Ireland! The dimensions given in that work are thus stated:

Common Hare, *Lepus timidus*;	*Inches.*
length to end of tail,	26
——— head,	5
——— tail,	$3\frac{1}{2}$
——— ears,	$4\frac{1}{4}$
from olecranon to end of middle hind-claw,	8
heel to end of second claw,	$5\frac{1}{2}$

* We learn from the Naturalists' Library, that the animal *does not occur near Hudson's Bay*, and that the specimens received in Edinburgh were sent by Dr. Gairdner from the Columbia River.

	Inches.
"IRISH HARE, *Lepus Hibernicus*;"	
length to end of tail,	24
——— head,	5
——— tail,	3½
——— ears,	4
from heel to end of claws,	5¾
"WHITE OR CHANGING HARE, *Alpine Hare*;"	
length to end of tail,	23!
——— head,	4¾
——— tail,	3½
——— ears,	3½
heel to end of claws,	5½

Our author next tells us of the difficulty he experienced in procuring specimens of the Marmot, and says, "*We* put *a ball* through *many*, but did not procure them. In fact the only way to be sure of getting a specimen is by sending a ball through the head. *My* friend Ramsay procured me two in this manner." The *italics* are our own, and serve to mark the authors English. As in speaking of his "friend Ramsay," he descends to the singular number, we are left to infer that, when he says "*we* put *a* ball through *many*,"—he must refer to *himself* and *his gun!* We are moreover scarcely prepared to admit the correctness of the phrase, "*a* ball through *many*," because it would seem to argue that *one* ball killed them *all*, whereas it is doubtless intended, that we should believe that *several* balls were expended!

These are blemishes in which no educated writer should indulge.

Of wild goats we are informed that the "*Thar*" was met with, to which, with his usual negligence, the writer applies the name of "*Capra Jemlaica*." The "*Thar*" is *not a goat*, but is the "*Antilope* (Nemorhœdus) *Thar*," of Hodgson, known to every sportsman of the western Himalayas by the names of "*Eimoo*" and "*Surrow*," while in Nepaul it is called "*Thar*." The "*Capra Jemlaica*," which Dr. Jameson met with, is the "*Capra Jharal*," vel "*Capra* (Hemitragus) *quadrimammis*," of Hodgson, known in the west as the "*Tehr*" and in Nepaul as the "*Jharal*." The curious fact of its possessing "four teats," is no new discovery of our author's, but was years ago

recorded by Mr. Hodgson, a notice of the novel circumstance having appeared from that gentleman's pen in the April number of the Journal of the Asiatic Society for 1836, nearly eleven years since! and had Dr. Jameson been less prone to rely upon his own imperfect knowledge, and more conversant with the labours and writings of his brother naturalists in India, he would have long since discovered in the pages of the same Journal, that the specific term of "*Quadrimammis*" was founded on the fact of the animals having "four teats!" But thus it is in all his writings; each strange or novel fact in the Natural History of this country which gradually falls under his observation, is at once published to the world, without allusion to other writers who may have preceded him, in a manner which leads many to believe, that it is a new discovery,—something with which to astonish India, and raise his own name and reputation in the scientific world, while all the time these facts, although novel to himself, have been for years well known to every naturalist in the country!

The "*ibex*" to which Dr. Jameson alludes, but to which he applies no name, either local or scientific, was some four years since distinguished by Mr. Blyth, as "*Capra Sakeen.*"

Not one bit more fortunate or correct is our author in his remarks on the bears of the Himalayas;—he says, "one would infer, that the black bear or bhallow, is confined to Thibet, seeing that it is styled "Ursus Thibetanus," now it is not found in Thibet at all, *(so Mr. Hodgson stated many years ago!)* being confined to the southern side of the Himalayas. It occurs, however, every where from the base of the mountains to the snows, that is, from Rajpore in the Deyrah Doon and in the Doon itself, to Neetee, or from a height of 1,000 to 14,000 feet." Now it will scarcely be credited that, with the single exception of the non-occurrence of the black bear in Thibet, the above is one tissue of errors. We have for some years past been busily engaged in collecting information regarding these animals with a view to ascertain what species actually occur in the tracts here alluded to, and we are therefore enabled to speak positively to the fact of the existence of at least four distinct species, of all of which we have possessed living individuals.

The first of these is the "red bear of Kunawur" and "snow bear" of travellers, the "*Ursus Isabellinus*" of naturalists. It resides

in the snowy region of the Himalayas, and occurs on both sides of the range, although Dr. Jameson says not; our information on this point is, however, positive, and Mr. Hodgson has likewise stated the same fact, although, as he observes, it clings to the mountains and does not descend to the plains of Thibet. It is a large and powerful animal, feeding principally on roots, especially the wild rhubarb, which it digs up with great ease and rapidity; it has no idea of climbing, for which the straightness of its claws is ill adapted. It is by no means averse to flesh, less so by far than the Thibet bear, though all the Himalayan bears may be said to exist principally on vegetable substances; snakes, lizards, and even carrion are however never despised by them.

The other three, we shall now proceed to notice.

In the first place it is necessary to observe, in contradiction of Dr. Jameson's erroneous statement, that "the black bear or bhallow," *is not* the "*Ursus Thibetanus*;" in the second place it *is not* found above Rajpore; and in the third place, there are no less than three distinct species of "black bears" inhabiting the tracts between the Doon and the Snows. Of the existence of two out of these three, Dr. Jameson appears to be perfectly ignorant, and therefore, as in the instance of the wild sheep, he doubles them all up under one name. This is certainly the shortest, though not the most approved method of treating the Natural History of a country!

The "*Ursus Thibetanus*," or "*Reech*" of the hill tribes, occurs, properly speaking, only among the wooded tracts of the interior, from the snow downwards, but it seldom or never approaches the southern limit of its range, or outer hills, except during the intensity of winter, when the inclemency of the season above, drives it down to seek a more genial climate; it usually appears on the outer range during the months of November, December, and the early part of January, in order to feast upon the acorns, wild pears, and berries which are then abundant, (the animal being essentially a tree bear, climbing fearlessly and with the greatest ease) but after this period it again retires towards the interior. It is neither a resident at Rajpore, at the foot of the outer range, nor in the Doon, but is supplanted in those localities by a totally distinct and well known species, namely, "the black bear or bhallow," the "*Ursus labiatus*" or thick-

lipped bear of naturalists, and common to many other parts of India; this last species is never known to cross the outer range, though it mounts along the southern side of it to feed, retiring again to its base where it usually resides; it has been well described in this country by Captain Tickell, who also gives a figure of it in the Calcutta Journal of Natural History. It appears to be a far more shy and sullen animal than the Thibet bear, which last, if taken young and well treated, is usually very good tempered. Even if by the rigours of a severe winter the "*Ursus Thibetanus*" is ever forced to descend into the Doon, which we doubt, the elevation of its range would still be above that which Dr. Jameson has assigned to it, for the elevation of the Doon is given at 2,500 and Rajpore at 3,500 feet above the sea; how then the animal can range in those places "from 1,000 feet (the elevation of Saharanpore!) to 14,000 feet," is a problem which we shall leave to be solved by the sagacity of our author! But even allowing that the animal may sometimes descend to the Doon, its stay there is very short, and is occasioned by the inclemency of an unusually severe winter, a thing in fact which may possibly occur once in a dozen years, and as soon as the temperature above becomes milder by the return of fair weather, away goes bruin back to the higher hills; consequently its appearance in the Doon must be regarded as accidental and extraordinary, and can be allowed no weight in fixing the range of the species; we are however by no means prepared to admit, that this accidental occurrence in the Doon, ever does take place.

The third species of black bear is as yet scarcely determined to our satisfaction, although of its existence there can be no doubt; it appears to be most nearly related to the "*Ursus Malayanus*" or Malay bear, and inhabits the same regions as the Thibet bear, than which however it is much more rare: it occurs among the wooded mountains of the western Himalayas, and was some years ago noticed by Mr. Hodgson among the Mammalia of Nepaul. The animal is black, with a white chin and pectoral crescent, its chief peculiarity consisting apparently in the colour of the head, which from the muzzle to the roots of the ears is of a dull rusty-red. The natives call it the "Bowna Reach," and say it becomes larger than

"U. Thibetanus," and is of a solitary disposition, and from its shyness is less destructive to their crops than the Thibet bear.

In his ornithology, our author is somewhat more cautious, dealing chiefly in generic names; still however, as to the "*Gallus Bankiva*," the common jungle cock of sportsmen, being found at an elevation of 5,000 feet, we must say we entertain strong doubts on the subject. The bird is not uncommon in the Doon, and along the base of the hills about Rajpore, which latter place we should say is the greatest elevation at which it has ever been found on the western ranges, that is, about 3,500 feet. As however we find some species to the westward confined to the Doon, which in Nepaul are said to occur on the hills, we do not deny the *possibility* of such likewise being the case in this instance.

In conclusion, while wishing Dr. Jameson every success in his future investigations, we would earnestly recommend the propriety of his looking somewhat oftener into the Indian Periodicals, wherein the labours of Indian Naturalists are recorded;—let him remember, for he is prone to overlook the fact, that it by no means follows, that that which is novel to him, must necessarily be so to others; and above all let him rest assured, that there are yet many things both in heaven and earth, that are alike unknown to the Edinburgh museum and to his own philosophy.

END OF VOLUME VII.

BISHOP'S COLLEGE PRESS.

POSTSCRIPT.

For the last month or two, newspapers and periodicals have been full of accounts of painless operations performed on individuals under the influence of the fumes of sulphuric ether. There is scarcely an hospital in Great Britain, in which its effects have not been tested; and in Calcutta, Madras, and Bombay, additional experiments have been made. There seems no reason to doubt that the discovery of the application of this hypnotic will form a most important era in surgery, as it differs from all other ones, in the facility with which it can be used, and in the certainty of its results. One might have expected, that occasional accidents, such as apoplexy from over-poisoning by the fumes, might have occurred, but such does not appear to be the case, and it would seem that we have few agents on the effects of which we can better depend. No dentist now ventures to operate without trying the effects of the ether, and it is certainly a grand thing to escape the horrors of tooth-drawing, even though we may not go the length of the boy, who wished to "have another tooth out for the fun of the thing."

The lateness in the arrival of our Foreign Journals, prevents our being able in this Number to allude to various matters of interest, which are at present attracting notice.

Thus, Professor Weber of Leipzic states, that he has discovered a rudimentary uterus, or rather the vestige of an uterus, in man, and in the male of the horse, pig, dog, cat, rabbit, and beaver; and we observe that M. Blandet has been reproducing sounds from the larynx of corpses by dexterous manipulation, which has led him to infer, that only one of the chordæ vocales is essential to voice, just as only one eye is required for vision. Liebig too, who has been carrying on an angry controversy with Mulder, now states as the result of his experiments, that *proteine* has no existence.

March 16th, 1847.